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OF THE
INDO-AUSTRALIAN ARCHIPELAGO

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VII

PERCIFORMES (CONTINUED)

Families: CHAETODONTIDAE, TOXOTIDAE,
MONODACTYLIDAE, PEMPHERIDAE,
KYPHOSIDAE, LUTJANIDAE,
LOBOTIDAE, SPARIDAE,
NANDIDAE, SCIAENIDAE,
MALACANTHIDAE, CEPOLIDAE

with 106 illustrations

BY

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AND

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Professor at the University and Director of the Zoological Museum
of Amsterdam

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INTRODUCTION

This seventh volume of the "Indo-Australian Fishes" contains the families *Chaetodontidae, Toxotidae, Monodactylidae, Pempheridae, Kyphosidae, Lutjanidae, Lobotidae, Sparidae, Nandidae, Sciaenidae, Malacanthidae, Cepolidae* belonging to the Division Perciformes of C. TATE REGAN's arrangement of the Order Percomorphi, which occupied a part of volume V and the whole volume VI. They are now concluded with the above named families in the present volume with an artificial Key to the families, based on the genera occuring in the Indo-Australian Archipelago.

In the Introductions to the preceding volumes the collections of fishes are mentioned of which we could dispose. Several important additions have been made since their publication, which were of help in preparing the present volume:

A collection of marine fishes from the Laboratory for the Investigation of the Sea at Batavia, Java, collected by Dr. J. VERWEY and Dr. J. D. F. HARDENBERG, for which we have also to thank Prof. H. C. DELSMAN, the late head of that institution.

We got also valuable material from Mr. J. KOOIMAN, who was so kind to collect for us at Batu Ulu, as the knowledge of the ichthyology of the South Coast of Java is rather limited.

Besides we are deeply indebted to Prof. H. BOSCHMA, Director of the Leiden Museum and Dr. F. P. KOUMANS, Curator of the collection of fishes, who most liberally assisted us during our visits to their collection or in sending specimens for examination. Our thanks are again due to Mr. C. TATE REGAN, Director of the British Museum (Natural History) and especially to Mr. J. R. NORMAN, Curator of the collection of fishes, for repeatedly affording to one of us the opportunity to study types in that Museum and to give both of us valuable information about them. We also thankfully acknowledge the assistance received from Mr. A. FRASER-BRUNNER, who lately revised the subfamily of Pomacanthinae, and his permission to reproduce some of his figures. We have to tender our sincere thanks to Prof. L. ROULE and Dr. J. PELLEGRIN, who gave to one of us all facilities to study types of Cuvier and Valenciennes in the Paris Museum. Also for valuable informations we got from Dr. G.

DUNCKER, Dr. V. PIETSCHMANN and Dr. S. L. HORA, which have greatly facilitated our task.

It will be of service to those who use the present volume, to remember, that in the Introduction to the second volume we have defined the character and geographical limits of the area from which the fishes are described.

For their benifit we repeat also the technical informations, given in the Introduction to the former volumes of this series.

"In describing the fishes we understand by *Length,* in the discussion of the proportions, the distance between the snout and the base of the caudal fin; in giving the largest size known for a species, we include the caudal fin.

The *Head* is measured from the tip of the snout to the end of the opercle, its proportion to the length is indicated e. g. as follows: head 4—4½ means, that the length of the head is contained 4 to 4½ times in the length.

Height is the maximum height; in special cases it is indicated how it is measured; the figures placed behind "height" indicate how many times it is contained in the length.

The size of the "*Eye*", the length of the "*Snout*", of the "*Jaws*", etc. are compared with the length of the head; thus "eye 4" means, that its diameter is $^1/_4$ of the length of the head.

In counting the *Scales,* under "L.l." is given the number of scales, with or without sensory organs, between the head and the caudal fin or, in most cases, between that fin and the upper corner of the opercle.

L.tr. $\frac{3\frac{1}{2}}{6\ (7)}$ signifies, that there are 3½ rows of scales between the dorsal fin and the lateral line and 6 to 7 below it, the lateral line itself is in this case not counted. In other cases the lateral line itself is also counted f.i.

L.tr. $\frac{\frac{4\frac{1}{2}}{1}}{1}$ (between D. and V.), which signifies, that there are 4½ rows of scales between the dorsal fin and the lateral line, one in the lateral line it self and one between it and the ventral fin.

In the *Fin formulae* the spines and the simple, non-branched rays are generally indicated by a figure, separated by a point from that of the number of the branched rays.

The last soft ray of the dorsal and anal, in case it is cleft to the base and therefore counted as two by some authors (BLEEKER e.g.) is reckoned as one, being supported by a single pterygophore.

The *Gillmembranes* may be totally free from each other and from the isthmus; they may be united, but still remain free from the isthmus; or they may be connected with the isthmus and with each other; when in the last case the posterior border of the united gillmembranes is not quite adnate to the isthmus, there remains a free posterior margin, running as a fold over the isthmus from one gillopening to the other.

We follow the law of priority and use the oldest name which can with certainty be made out by the description, belonging to a certain species. Its author is quoted as the author of the species and his paper is quoted in the first place, when there is no stringent reason to do otherwise.

Mention is further made of all synonyms; besides, we have quoted those papers, which contain a description of the species. If it is a widely spread one, only those papers are quoted, which contain a description of or give some informations — others than those regarding locality only — about Indo-Australian specimens of that species.

According to the international rules of nomenclature we have neglected the generic names, as e.g. those of SWAINSON, which are not accompanied by a description.

We have recorded under "nomina indigena" those native names, which seemed to us to be trustworthy. We are of opinion that no great value ought to be attached to them, as the unavoidable series of difficulties is still enlarged by the fact, that the authorities for those names have mostly been European or American ichthyologists and no linguists."

We are much grieved to have lost as secretary Miss C. H. W. MET, who died in 1935. Her accurate and patient work during more than 25 years was a great help in writing this series.

The drawings illustrating this volume are again executed by Mr. J. F. OBBES with his usual skill and care. Finally our best thanks are due to Mr. Th. FOLKERS director of the printing and publishing firm E. J. BRILL LTD. of Leiden, who showed the same help and interest as his predecessor the lamented Mr. C. PELTENBURG in publishing this volume.

$\frac{\text{Eerbeek}}{\text{Amsterdam}}$, March 1936

MAX WEBER
L. F. DE BEAUFORT

SYSTEMATIC INDEX

page
Order PERCOMORPHI (continued) 1
I. Suborder **Percoidea** (continued) 1
  1. Division PERCIFORMES (continued and key) 1, 555
20. Fam. CHAETODONTIDAE . . 1
  1. Subfam. Scatophaginae 3
    1. *Scatophagus* Cuvier & Valenciennes . . . 6
      1. argus (Bl.) 6
      2. argus var. tetracanthus (Lac.) . . 9
      3. multifasciatus Richards. 10
  2. Subfam. Chaetodontinae 13
    1. *Forcipiger* (Jordan & Mc Gregor) Jordan & Evermann 16
      1. longirostris (Broussonet) 17
    2. *Chelmon* Cloquet . . 18
      1. rostratus (L.) . . 20
    3. *Microcanthus* Swainson 22
      1. strigatus (C.V.) . . 22
    4. *Hemitaurichthys* Bleeker 24
      1. zoster (Bennett) . . 25
page
    5. *Coradion* Kaup . . . 27
      1. chrysozonus (C.V.) . 28
      2. melanopus (C.V.) . 30
    6. *Parachaetodon* Bleeker 32
      1. ocellatus (C.V.) . . 33
    7. *Heniochus* Cuvier . . 35
      1. acuminatus (L.) . . 37
      2. permutatus C.V. (apud Bennett) . . 40
      3. monoceros C.V. . . 41
      4. varius (Cuvier) . . 42
      5. singularius Smith & Radcliffe 45
    8. *Gonochaetodon* Bleeker 47
      1. triangulum (C.V.) . 48
    9. *Megaprotodon* Guichenot 50
      1. strigangulus (Gm.) . 51
    10. *Chaetodon* Linnaeus (p.p.) 52
1. Subgenus *Tetrachaetodon* novum 56
  plebeius C.V. 56
2. Subgenus *Rhabdophorus* Swainson 59
  1. ephippium C.V. 59
  2. semeion Blkr. 61
  3. bennetti C.V. 62
  4. speculum C.V. 64
  5. trifasciatus Mungo Park 66
3. Subgenus *Citharoedus* Kaup 69
  1. meyeri Bloch, Schneider . 69
  2. ornatissimus C.V. . . . 71

page
4. Subgenus *Tetragonoptrus* Klein 72
1. octofasciatus Bloch . . . 72
2. punctato-fasciatus C.V. . 75
3. citrinellus C.V. 76
4. güntheri Ahl 79
5. miliaris Q. & G. 80
5. Subgenus *Chaetodontops* Bleeker 83
1. lunula (Lac.) 83
2. melanotus Bloch, Schneider 87
3. selene Blkr. 90
4. collare Bloch 91
5. bella-maris Seale 93
II. *Anisochaetodon* Klunzinger 94
1. Subgenus *Lepidochaetodon* Bleeker 97
1. unimaculatus (Bloch) . . 97
2. kleini (Bloch) 99
3. trivirgatus n. sp. . . . 101
2. Subgenus *Linophora* Kaup . 103
1. auriga (Forsk.) 103
2. vagabundus (L.) 106
3. rafflesi (Bennett) . . . 109
4. chrysurus (Desjardins) . 111
3. Subgenus *Oxychaetodon* Bleeker 114
1. lineolatus C.V 114
2. falcula (Bloch) 116
3. Subfam. Pomacanthinae 119
1. *Chaetodontoplus* Bleeker 122
1. mesoleucus (Bloch) 123
2. dubouleyi (Gthr) . . 125
3. melanosoma Blkr. . 126
4. septentrionalis (Schl.) 127
2. *Pomacanthus* Lacépède 129
1. Subgenus *Pomacanthodes* Gill 131
1. imperator (Bloch) . . . 132
2. annularis (Bloch) . . . 135
3. striatus (Rüpp.) 137
4. chrysurus (C.V.) 139
5. semicirculatus (C.V.) . . 141

page
3. *Euxiphipops* Fraser-Brunner 145
1. sexstriatus (C.V.) . 146
2. xanthometopon (Blkr.) 148
3. navarchus (C.V.) . . 149
4. *Genicanthus* Swainson 150
1. lamarck (Lac.) . . 151
2. melanospilus (Blkr) 153
5. *Holacanthus* Lacépède 154
1. Subgenus *Apolemichthys* Fraser-Brunner . . . 154
1. trimaculatus C.V. . . . 155
6. *Pygoplites* Fraser-Brunner 156
1. diacanthus (Bodd.) . 157
7. *Centropyge* Kaup . . 159
1. multifasciatus Smith & Radcl. . . . 161
2. bicolor (Bloch) . . 161
3. tibicen (C.V.) . . . 163
4. nox (Blkr.) 164
5 bispinosus (Gthr.) . 165
6. vroliki (Blkr) . . . 167
4. Subfam. Zanclinae . . 168
1. *Zanclus* Cuvier & Valenciennes . . 169
1. cornutus (L.) . . . 170
2. canescens (L.) . . 172
5. Subfam. Ephippinae 175
1. *Ephippus* Cuvier . . . 176
1. orbis (Bl.) 177
6. Subfam. Drepaninae 178
1. *Drepane* Cuvier & Valenciennes . . 179
1. punctata (L.) . . . 180
7. Subfam. Platacinae . 182
1. *Platax* Cuvier 183
1. teira (Forsk.) . . . 185
2. orbicularis (Forsk.) 189
3. batavianus C.V. . . 191
4. pinnatus (L.) . . . 192
Doubtful species
5. melanosoma Blkr. . 194

page
21. Fam. TOXOTIDAE 194
  1. *Toxotes* Cuvier 195
    1. lorentzi M. Web. . . 198
    2. jaculator (Pall.) . . . 199
    3. microlepis Gthr. . . . 202
    4. chatareus (Ham. Buch.) 203
    5. oligolepis Blkr. . . . 205
22. Fam. MONODACTYLIDAE . . 206
  1. *Monodactylus* Lacépède . 207
    1. argenteus (L.) . . . 207
23. Fam. PEMPHERIDAE 210
  1. *Pempheris* Cuvier . . . 210
    1. moluca C.V. 213
    2. oualensis C.V. 216
    3. otaitensis C.V. . . . 217
    4. vanicolensis C.V. . . . 218
    5. schwenki Blkr. . . . 219
  2. *Leptobrama* Steindachner 220
    1. mülleri Steindachner . 220
24. Fam. KYPHOSIDAE 221
  1. *Kyphosus* Lacépède . . . 222
    1. cinerascens (Forsk.) . 224
    2. lembus (C.V.) 226
    3. vaigiensis (Q. G.) . . 227
  2. *Protcracanthus* Günther . 230
    1. sarissophorus (Cantor) 231
25. Fam. LUTJANIDAE 232
  1. Subfam. Lutjaninae 233
    1. *Lutjanus* Bloch . . . 235
      1. nematophorus (Blkr.) 240
      2. fuscescens (C.V.) . 241
      3. ehrenbergi (Peters) 242
      4. maxweberi Popta . 243
      5. johni (Bl.) 244
      6. argentimaculatus (Forsk.) . . . 246
      7. chrysotaenia (Blkr.) 248
      8. vitta (Q. G.) . . . 250
      9. lutjanus Bl. 251
      10. lineolatus (Rüpp.) . 253
      11. biguttatus C.V.) . . 255
      12. kasmira (Forsk.) . . 256
      13. rufolineatus (C.V.) 259
      14. sebae (C.V.) . . . 261

page
      15. gibbus (Forsk) . . 263
      16. sanguineus (C.V.) . 265
      17. malabaricus (Bl. Schn.) . . . 268
      18. dodecacanthoides (Blkr.) . . . 269
      19. fulviflamma (Forsk.) 270
      20. russelli (Blkr.) . . 272
      21. rangus (C.V.) . . . 274
      22. semicinctus Q. G. . . 275
      23. bohar (Forsk.) . . 276
      24. lunulatus (Mungo Park) 278
      25. vaigiensis (Q. G.) . 279
      26. janthinuropterus (Blkr.) . . . 281
      27. lemniscatus C.V. . 283
      28. monostigma (C.V.) 284
      29. decussatus (C.V.) . 285
      30. rivulatus (C.V.) . . 287
      31. niger (Forsk.) . . . 289
    Doubtful species
      Mesoprion erythrozona Bleeker 292
      Lutjanus Quoyi Bleeker 292
      Diacope Gthr? 292
    2. *Pinjalo* Bleeker . . . 292
      1. pinjalo (Blkr.) . . 293
    3. *Caesio* Lacépède . . . 294
      1. tile C.V. 296
      2. erythrogaster (K. v. H.) C.V. 298
      3. lunaris C.V. 299
      4. xanthonotus Blkr. . 301
      5. pisang Blkr. . . . 302
      6. chrysozona (K. v. H.) C.V. . . . 303
      7. diagramma Blkr. . . 305
      8. caerulaureus Lac. . . 306
    4. *Symphysanodon* Bleeker . . . 308
      1. typus Blkr. 309
    5. *Aprion* Cuvier & Valenciennes 310
      1. virescens C.V. . . 311

page
2. microlepis (Blkr.) . 312
3. typus (Blkr.) . . . 313
Doubtful species
Pristipomoides sp. aff. typus Duncker . . 315
6. *Gymnocaesio* Bleeker . 315
1. gymnopterus (Blkr.) 316
7. *Aphareus* Cuvier & Valenciennes . . . 317
1. furcatus (Lac.) . . 318
2. rutilans C.V. . . . 319
8. *Mirolabrichthys* Herre 321
1. tuka Herre 322
2. waitei Fowler . . . 323
2. Subfam. Nemipterinae 324
1. *Scolopsis* Cuvier . . . 325
1. margaritifer C.V. . 328
2. leucotaenia Blkr. . . 329
3. inermis Schl. . . . 330
4. trilineatus Kner . . 331
5. ciliatus (Lac.) . . . 332
6. personatus C.V. . . 333
7. taeniopterus C.V. . 335
8. cancellatus C.V. . . 335
9. ghanam (Forsk.) . . 337
10. xenochrous Gthr. . 338
11. bilineatus (Bl.) . . 339
12. vosmaeri (Bl.) . . . 341
13. temporalis C.V. . . 342
14. dubiosus M. Weber . 344
15. monogramma C.V. . 345
16. phaeops Benn. . . . 346
2. *Gnathodentex* Bleeker 347
1. aurolineatus (Lac.) . 348
3. *Monotaxis* Bennett . . 349
1. grandoculis (Forsk.) 350
4. *Nemipterus* Swainson . 352
1. peronii (C.V.) . . 357
2. sundanensis (Blkr.) . 358
3. ovenii (Blkr.) . . . 359
4. hexodon (Q. G.) . . 360
5. celebicus (Blkr.) . . 362
6. nemurus (Blkr.) . . 364
7. metopias (Blkr.) . . 365
8. nematophorus (Blkr.) 366

page
9. tolu (C.V.) 367
10. japonicus (Bl.) . . 369
11. oveniides (Popta) . 371
12. marginatus (C.V.) . 372
13. mesoprion (Blkr.) . 373
14. tambuloides (Blkr.) . 374
15. balinensis (Blkr.) . 375
16. balinensoides (Popta) . . . 376
17. sumbawensis (Blkr.) 377
18. zysron (Blkr.) . . . 378
19. upeneoides (Blkr.) . 379
20. gracilis (Blkr.) . . 379
5. *Pentapus* Cuvier & Valenciennes . 380
1. caninus (C.V.) . . 382
2. setosus C.V. . . . 384
3. nemurus (Blkr.) . . 386
4. macrurus (Blkr.) . 387
5. hellmuthi (Blkr.) . 388
6. microdon (Blkr.) . 389
6. *Gymnocranius* Klunzinger . . 390
1. griseus (Schl.) . . 391
7. *Symphorus* Günther . 394
1. spilurus Gthr. . . . 395
2. taeniolatus Gthr. . . 395
3. Subfam. Pomadasynae 396
1. *Pomadasys* Lacépède . 397
1. furcatus (Bl. Schn.) 399
2. maculatus (Bl.) . . 400
3. hasta (Bl.) 402
4. argyreus (C.V.) . . 406
5. olivaceus (Day) . . 407
6. auritus (C.V.) . . . 408
2. *Plectorhynchus* Lacépède . . . 409
1. crassispina (Rüpp.) . 410
2. chaetodonoides Lac. 413
3. polytaenia (Blkr.) . 414
4. lineatus (C.V.) . . 415
5. goldmanni (Blkr.) . 418
6. chrysotaenia (Blkr.) 419
7. celebicus Blkr. . . . 420
8. albovittatus (Rüpp.) 422

page
9. cuvieri (Benn.) . . 423
10. orientalis (Bl.) . . 425
11. pictus (Thunb.) . . 426
Doubtful species
Plectorhynchus griseus (C.V.) 429
4. Subfam. Lethrininae 429
1. *Lethrinus* Cuvier . . . 430
1. kallopterus Blkr. . . 432
2. nematacanthus Blkr. 433
3. variegatus C.V. . . 435
4. microdon C.V. . . . 436
5. reticulatus C.V. . . 438
6. haematopterus Schl. 440
7. hypselopterus Blkr. . 443
8. mahsena (Forsk.) . 444
9. miniatus ((Forster) Bl. Schn.) . . 445
10. ornatus C.V. . . . 447
11. rhodopterus Blkr. . 450
12. leutjanus (Lac.) Blkr. 451
13. nebulosus (Forsk.) . 453
14. ramak (Forsk.) . . 455
Doubtful species
Lethrinus cinereus C.V. 456
26. Fam. Lobotidae 457
1. *Lobotes* Cuvier 457
1. surinamensis (Bloch) . 459
2. *Datnioides* Bleeker . . . 460
1. quadrifasciatus (Sevastianov) . 462
2. microlepis Blkr. . . 463
27. Fam. Sparidae 465
1. *Sparus* Linné 465
1. spinifer Forsk. . . . 466
2. sarba Forsk. 468
3. australis (Gthr.) . . . 469
4. berda Forsk. 470
5. bifasciatus (Forsk.) . . 473
Doubtful genus and species Cantharus lineolatus C.V. . . 474
28. Fam. Nandidae 475
1. Subfam. Nandinae . . 476
1. *Nandus* C.V. 476
1. nebulosus (Gray) . 477
2. Subfam. Pristolepidinae 478
1. *Pristolepis* Jerdon . . 478
1. fasciatus (Blkr.) . . 479
2. grooti (Blkr.) . . . 480
29. Fam. Sciaenidae 481
1. *Otolithes* (Cuvier) Oken 487
1. lateoides Blkr. 488
2. ruber (Bloch, Schneider) 490
3. argenteus C.V. . . . 492
4. maculatus (C.V.) . . 493
2. *Pama* Fowler 495
1. pama (Ham. Buch.) . 496
2. perarmata Chabanaud 498
3. *Otolithoides* Fowler . . 499
1. biauritus (Cantor) . . 500
2. brunneus (Day) . . . 502
3. microdon (Blkr.) . . 503
4. *Pseudosciaena* Bleeker . 505
1. goldmani (Blkr.) . . . 507
2. aneus (Bloch) . . 508
3 birtwistlei (Fowler) . . 510
4. axillaris (C.V.) . . . 511
5. sina (C.V.) 513
6. diacanthus (Lac.) . . 515
7. coibor (Ham. Buch.) . 517
8. polycladiscus (Blkr.) . 519
9. soldado (Lac.) . . . 520
10. microlepis (Blkr.) , , 522
Doubtful species
11. borneensis (Blkr.) . . 523
12. plagiostoma (Blkr.) . 525
5. *Johnius* Bloch (p.p.) . . 526
1. jubatus (Blkr.) . . . 527
2. trachycephalus (Blkr.) 528
3. carutta Bloch 529
4. dussumieri (C.V.) . . 530
5. hypostoma (Blkr.) . . 532
6. belengeri (C.V.) . . . 533
7. semiluctuosus (C.V.) . 535
8. novae-hollandiae (Steind.) . . 537

Doubtful species as to their synonymy and locality

page

- 9. maculatus Bloch, Schneider . . 538
- 10. osseus (Day) 541

6. *Sciaena* Linnaeus . . . 541
  - 1. dussumieri (C.V.) . . 542
  - 2. russelli (C.V.) 544
  - 3. macroptera (Blkr.) . . 546

page

30. Fam. MALACANTHIDAE . . . 547
  - 1. *Malacanthus* Cuvier . . . 548
    - 1. hoedti Blkr. 550
    - 2. latovittatus (Lac.) . . 551

31. Fam. CEPOLIDAE 552
  - 1. *Acanthocepola* Bleeker . 553
    - 1. abbreviata (C.V.) . . 553
  - Key to the indo-australian families of Perciformes . 555

Addenda and Corrigenda . . . 561

Order PERCOMORPHI (continued).

I. Suborder **Percoidea** (continued).

1. Division PERCIFORMES (continued).

20. Family CHAETODONTIDAE.

More or less compressed, oblong, suborbicular, much elevated or rhombic, covered with moderate-sized, small or minute ctenoid scales, which are finely ciliated, smooth or with longitudinal rugosities, present on head and more or less extended on median fins; the squamation in general may be equal or unequal as to size and arrangement of scales; lateral line usually complete, arched, concurrent with the profile of the back. Eyes lateral. Two more or less approximate nostrils on each side of the generally short head. Mouth small, terminal, protractile or not; teeth slender or elongate, often tricuspid, incised or setiform, in narrow brush-like bands in jaws; palate usually toothless. Branchiostegals five to seven; pseudobranchiae present; four gills with a slit behind the fourth; gill-menbranes usually united, free from isthmus or narrowly or broadly attached to it, the branchial aperture being reduced to a narrow slit. Pharyngeal bones not united or coossified. The single dorsal fin long, its spinous part differentiated or not from the soft dorsal. Anal similar to soft dorsal, with three to four, by exception five spines. Caudal truncate, rounded or emarginate, with 14 to 17 branched rays. Pectorals with the lower rays branched. Ventrals thoracal, with a spine and five rays, often with an axillary scaly process. An occipital crest present. Vertebrae usually 10 + 14 (24), in Scatophagus 10 + 13 (23), in Zanclus reduced to 9 + 13 (22). In their development they pass through a metamorphosis with larval organs, known as Tholichthys-stage, described on page 3.

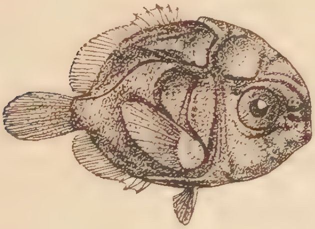

Fig. 1. *Tholichthys-stage of Parachaetodon ocellatus* (C. V.) × 4. After Lütken.

Distribution: Marine tropical, carnivorous fishes, the majority of which is represented in the indo-pacific region according to their habit to frequent coral reefs and costal localities with similar biological character. Only a few as *Scatophagus, Chelmon* and *Anisochaetodon rafflesi* Bennett enter estuaries or extend their habitat outside the Tropics. Many of them are renowned for their bright, gaudy colours and their great activity and quickness of movement.

Key to the Indo-australian subfamilies of Chaetodontidae.

I. Anal with 4 spines. Spinous dorsal differentiated from soft dorsal, the first spine procumbent. Mouth small, transverse, not protractile. Gillmembranes forming a fold across the scaly isthmus to which they are narrowly attached. Posttemporal solidly united to skull. Branchiostegals 6—7. Scale minute, adherent . . . . 1. *Scatophaginae* p. 3.

II. Anal with 3 to 4 (5) spines. Spinous dorsal without procumbent spine, sometimes differentiated from, usually totally confluent with soft dorsal. Mouth protractile. Gillmembranes united or not, free from isthmus or narrowly attached to it. Posttemporal solidly united to skull. Branchiostegals 6—7. Scales moderate or small.

1. Preoperculum serrate or not, but in adult without a strong spine. Anal with 3—4 (5) spines. Ventrals with an axillary scale . . . . 2. *Chaetodontinae* p. 13.

2. Preoperculum strongly armed including a long spine at the angle. Anal with 3 spines. Ventrals without an axillary scale. . . . . 3. *Pomacanthinae* p. 119.

III. Anal with 3 spines. Spinous dorsal confluent with soft dorsal; no procumbent spine. Gillmembranes and isthmus not differentiated from the praeventral integument, which covers a bony thoracal cuirass. Branchiostegals 4—5. Scales minute, nearly microscopic . . . . 4. *Zanclinae* p. 168.

IV. Anal with 3 spines. Gillmembranes broadly united with scaly isthmus. Posttemporal not coossified with skull. Branchiostegals 6.

1. Spinous dorsal differentiated from soft dorsal; first spine procumbent.

a. Mouth not protractile; maxilla not exposed. Pectorals rounded, short. A broad subocular shelf. Scales smooth moderate-sized. . . . 5. *Ephippinae* p. 175.

b. Mouth protractile; maxilla distally exposed. Pectorals falcate, elongate. No subocular shelf. Scales ciliated medium-sized. . . . 6. *Drepaninae* p. 178.

2. Spinous dorsal confluent with soft dorsal; no procumbent spine. Mouth not protractile, maxilla not exposed. Suborcular shelf feeble . 7. *Platacinae* p. 182.

1. Subfam. SCATOPHAGINAE.

Much compressed, rhomboidal, covered with minute, ctenoid, adherent scales, present also on head and extending on soft dorsal and anal; lateral line complete, arched, concurrent with the dorsal profile. Head small, with an abrupt ascending occipital crest. Eyes lateral, in anterior half of head. Paired approximate nostrils on each side of head. Mouth small, square, terminal, not protractile; maxilla concealed. Opercular apparatus complete, without spines or serrations; preorbital rather high; a subocular shelf present. Six to seven branchiostegals; gillmenbranes united with isthmus, forming a narrow cutaneous fold across it; four gills with a slit behind the last; pseudobranchiae present. Teeth in jaws setiform, tricuspidate, movable; none on vomer and palatines. Two dorsals united at the base, a longer anterior portion preceded by a procumbent short spine and with eleven to twelve strong heteracanth spines and a shorter posterior portion of sixteen to eighteen rays. Anal with four strong heteracanth spines and fourteen to fifteen rays. Pectorals rather small, rounded, ventrals inserted somewhat behind their base with a spine and five branched rays and a small scaly axillary process. Caudal nearly truncate with sixteen branched rays. The posttemporal is solidly united to the skull. There are 23 (10 + 13) vertebrae and the ribs are sessile, inserted high up on the centra or on the base of the neural arches.

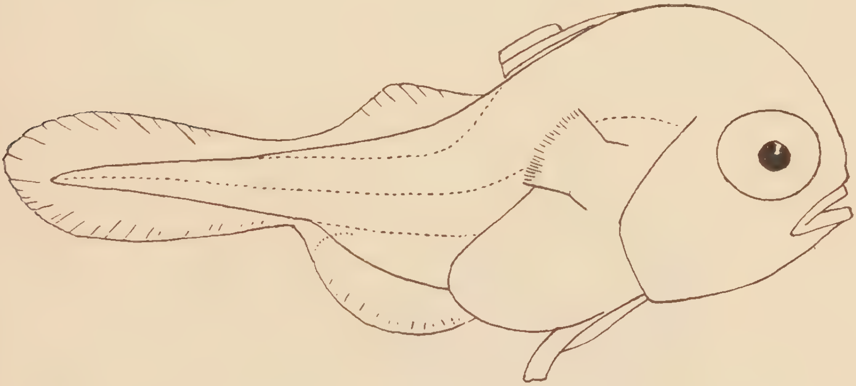

Fig. 2. *Scatophagus argus* (Bloch) Larval stage of 3.2 mm length After Hora.

Distribution, that of the single genus known.

Note: These fishes pass in their development through a metamorphosis similar to that of the *Chaetodontidae*. A very young specimen of 3.2 mm length with the yolk still attached to the body is described by *Hora* (Mem. Asiat. Soc. Bengal VI, 1924, p. 490). (Fig. 2). This stage is followed by a series of larval stages distinguished by the possession of transitory larval organs which change the exterior, compared with that of the definite fish, in a manner that they first were described by Günther as a distinct genus *Tholichthys*. These Tholichtys-stages are characterized by a compressed, rounded body, large head with very small mouth and harnassed by the naked, dorsally strongly arched bones of the head and by an extensive suprascapular and humeral bony plate, which cover the back till the dorsal fin and the anterior sides of body. Both are independent cutaneous bones, sometimes erroneously described as produced from the free edges of the bones of the head. Besides there is a postorbital bony knot, or a distinct preopercular bony

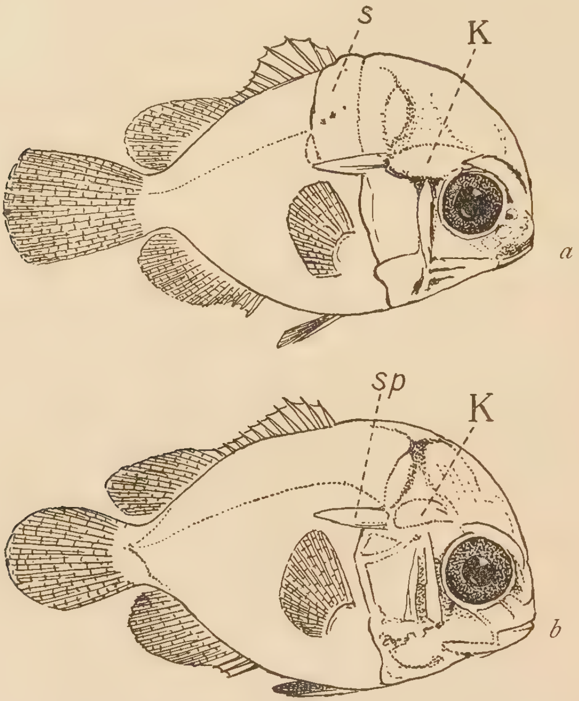

Fig. 3 *a* and *b*. Four suceeding larval (*Tholichthys*—) stages of *Scatophagus argus* (Bloch). K. postorbital knot with suprascapular spine sp, p preopercular spine, s suprascapular and humeral plate, showing their gradual disappearance with growth in specimens of 10 mm length, somewhat more (*b*), of 13 mm (*c*), of 16.5 mm (*d*) × 6, the preceding × 7. After M. Weber.

plate, carrying a strong suprascapular spine. Of these transitory larval organs the two lastnamed persist the longest, while the suprascapular and humeral plate disappear first in the young growing *Scatophagus*. They are already absorbed in specimens of about 10 mm length (fig. 3a), while rudiments of the suprascapular spine and its knot are still present in specimens of 16 mm length (fig. 3d).

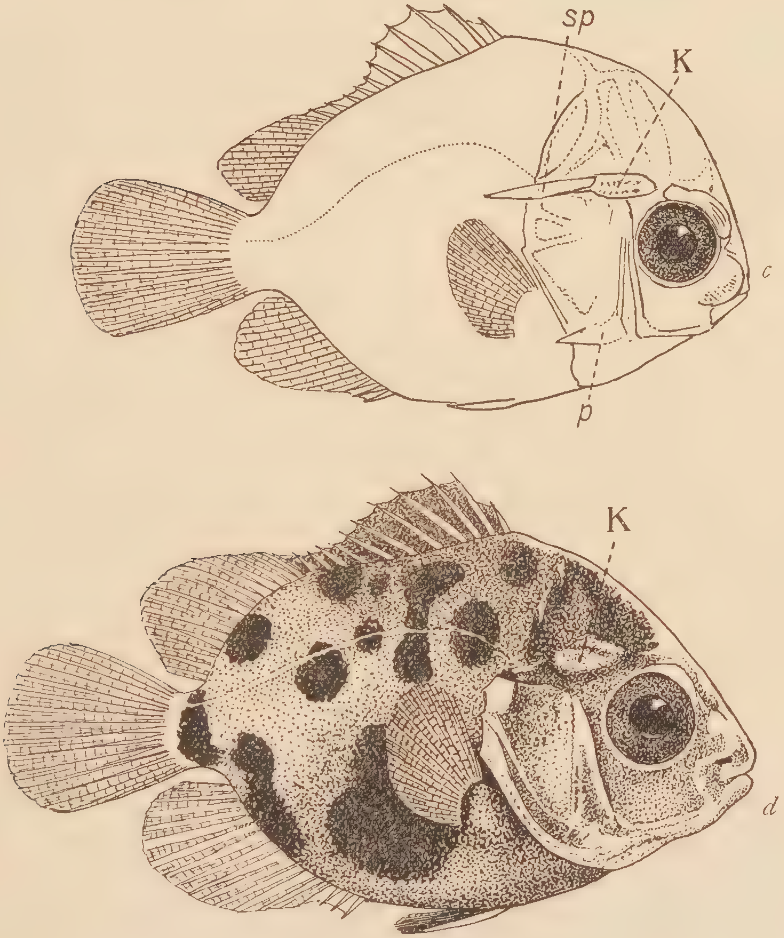

Fig. 3 *c* and *d*. Four succeeding larval (*Tholichthys* —) stages of *Scatophagus argus* (Bloch). K postorbital knot with suprascapular spine sp, p preopercular spine, a suprascapular and humeral plate, showing their gradual disappearance with growth in specimens of 10 mm length, somewhat more (*b*), of 13 mm (*c*), of 16.5 mm (*d*) × 6, the preceding × 7. After M. Weber.

1. **Scatophagus** Cuvier & Valenciennes.

(Cuvier & Valenciennes, Hist. Nat. Poissons VII, 1830, p. 136).
Cacodoxus Cantor, Journ. Asiat. Soc. Bengal XVIII (1849) 1850, p. 1145.
Ephippus Bleeker, Verh. Akad. Amsterdam XVIII (1876) 1877, p. 26 (nec Cuvier & Valenciennes).

For characters of the single genus known see those of the subfamily.

Distribution. From East coast of Africa, British India, Andamans, Malay Peninsula, Siam, Tonkin, South coast of China, Formosa, Philippines, throughout the Archipelago, Australia to New Caledonia and Tahiti. Living in sea, brackish water of estuaries, entering freshwater of rivers and lakes. In some places valued as food in others not eaten, being a foul feeder, living of animal food but attracted also by foul substances.

Key to the Indo-australian species of *Scatophagus*.

1. Sides of body spotted, only in very juvenile state sometimes anteriorly with a few transverse stripes. Hind-margins of soft dorsal and anal subvertical . . . . 1. *Sc. argus* p. 6.
2. Body with six brown cross-bands . . 2. *Sc. argus* var. *tetracanthus* p. 9.
3. Sides of body with 16 to 18 narrow black bands from back surpassing lateral line, spotted below. Hind-margins of soft dorsal and anal oblique in antero-posterior direction. 3. *Sc. multifasciatus* p. 10.

1. **Scatophagus argus** (Bl.) (Fig. 3 and 5).

Chaetodon argus Bloch, Ausl. Fische III, 1788, p. 86, tab. 204, fig. I, — Bloch, Schneider, Syst. ichth. 1801, p. 232.
Chaaetodon argus Linné, Gmelin, Syst. nat. edit. XIII, 1788, p. 1248.
Chaetoden argus Shaw, Gen. Zool. IV, 1803, p. 332.
Ephippus argus Cuvier, Règne anim. 1817, II, p. 335.
Chaetodon atro-maculatus Bennett, Fish. Ceylon 1828. Pl. 18.
Scatophagus argus Cuvier & Valenciennes, Hist. nat. Poissons VII, 1831, p. 136.
Scatophagus Bougainvillii Cuvier & Valenciennes, l. c. p. 142.
Scatophagus ornatus Cuvier & Valenciennes, l. c. p. 143.
Scatophagus purpurascens Cuvier & Valenciennes, l. c. p. 144.
Scatophagus argus Bleeker, Nat. & Geneesk. Arch. Ned. Ind. (3) II, 1845, p. 520 (name only).
Scatophagus macronotus Bleeker, ibidem (monstrositas).
Scatophagus argus Bleeker, Verh. Batav. Gen. XXIII, (1849) 1850, Chaetodont. p. 24.
Cacodoxus argus Cantor. Journ. Asiat. Soc. Bengal XVIII, (1849) 1850, p. 1145 .

Scatophagus ornatus Bleeker, Nat. Tijdschr. Ned. Ind. VI, 1854, p. 492.
Scatophagus argus Günther, Cat. Brit. Mus. II, 1860, p. 58.
Scatophagus argus Kner, Novara-Exp. Fische 1865—1867, p. 106.
Scatophagus ornatus Kner, l. c. p. 272.
Scatophagus argus Günther, Ann. Mag. Nat. Hist. (3) XX, 1867, p. 58.
Scatophagus argus v. Martens, Exp. Ost-Asien, 1876, p. 310.
Scatophagus ornatus v. Martens l. c. p. 388.
Ephippus argus Bleeker, Verh. Akad. Amsterdam XVIII, (1876) 1877, p. 26. — Atl. ichth. IX, 1877, p. 21.
Scatophagus argus de Castelnau, Proc. Linn. Soc. N. S. Wales, II, 1878, p. 234.
Scatophagus argus var. ocellata Klunzinger, Sitz. Akadem. Wien, 1880, p. 363.
Scatophagus argus Macleay, Descr. Cat. Austral. Fish. I, 1884, p. 95.
Scatophagus quadranus De Vis, Proc. Linn. Soc. N.S. Wales, IX, 1884, p. 455.
Scatophagus argus Day, Fish. India 4° 1878—1888, p. 114.
Scatophagus argus Vinciguerra, Pesci di Birmania 1890, p. 164.
Scatophagus ornatus Volz, Zool. Jahrb. System. XIX, 1903, p. 355.
Scatophagus argus M. Weber, Nova Guinea IX, Zool. 1913, p. 588.
Scatophagus argus? Seale & Bean, Proc. U. S. Nat. Mus. XXXIII, 1908, p. 246.
Scatophagus argus M. Weber, Siboga-Exped. Fische 1913, p. 302.
Scatophagus argus de Beaufort, Bijdr. Dierk. Leiden 1913, p. 124.
Scatophagus argus Mc Culloch, Check list fish. Austral. Zoologist, II, 1922, p. 90.
Scatophagus argus Hora, Mem. Asiat. Soc. Bengal vol. VI, 1924, p. 490.
Scatophagus argus Barnard, Ann. S. Afric. Mus. XXI, 1925-27, p. 618.
Scatophagus argus Delsman, Treubia VIII, 1926, p. 400, 409 (larvae).
Scatophagus argus Herre & Montalban, Philipp. Journ. Sci. XXXIV, 1927, p. 8.
Scatophagus argus Fowler, Fish. Oceania, Mem. Bishop Mus. X, 1928, p. 242.
Scatophagus ornatus Duncker & Mohr, Mitt. Zool. Mus. Hamburg XLIV, 1929, p. 74.
Scatophagus argus Fowler & Bean, Bull. U. S. Nat. Mus., vol. 8, 1929, p. 35.
Scatophagus argus Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 59.

D. XI, 16—18; A. IV, 14—15.

Strongly compressed, quadrangular; rostro-dorsal profile strongly ascending, from mouth to vertex nearly vertical with a more or less concave vertex, thence convex to dorsal. Height 1.5-1.7 in length, 1.7-2 in length with caudal; head more or less than 3, 3.4—4 in length with caudal. Eye 3.5 to about 4 in head, situated nearly in middle of head, far distant from high convex interorbital space which is equal to or more than diameter of eye. Mouth very small, horizontal; pluriseriate, tricuspidate, small moveable teeth in jaws. Lateral line arched, about 95 to 120 scales between branchial opening and caudal, and about 80 between ventral and dorsal fins. Spines of dorsal heteracanth, the first procumbent, small, often not visible, the following increasing in size and strength to fifth which is the longest and subequal to the fourth, which is equal to or somewhat shorter than head without snout. Penultimate spine shorter than ultimate, which is adherent to soft dorsal and about equal te eye. Anal spine strong, the second and fourth usually the longest, about equal to postorbital part of head. Soft dorsal and anal scaly; their anterior and middle rays the longest gradually getting shorter, their posterior margin more or less rounded and inclined towards caudal and therefore subvertical; their margins touching a slightly inclined vertical line through caudal or its peduncle. Caudal fanshaped. Pectorals somewhat obtuse, shorter than head without snout; ventrals with a strong spine and the first ray prolonged till anal. Bleeker who had 60 specimens of different age and from different localities at his disposal gives the following description. Above bluish-gray, greenish, steel-coloured, brownish-violet or blackish, below diluted silvery, pear-coloured or yellowish; body in adolescent or fullgrown specimens with smaller or larger, more or less numerous brown round and oval stains or spots, sometimes extend-

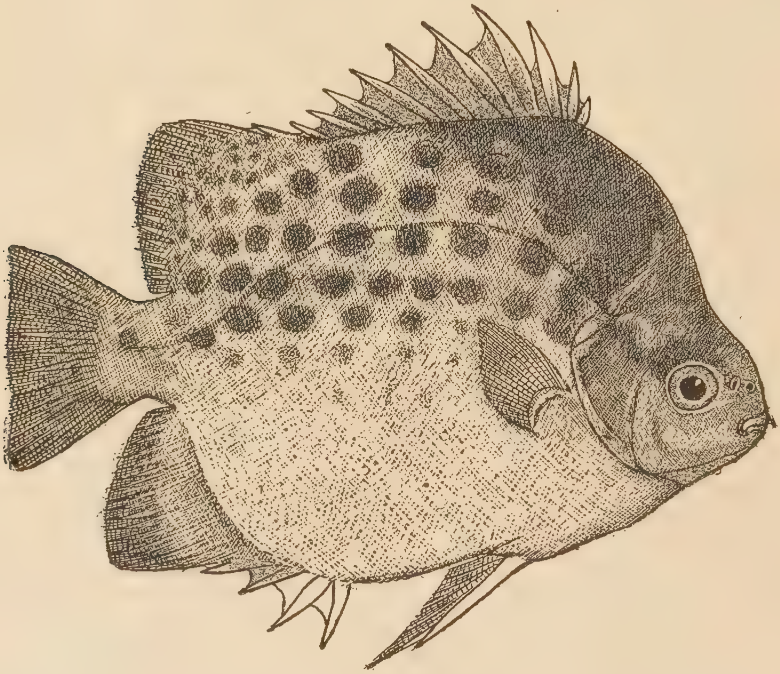

Fig. 5. *Scatophagus argus* (Bloch) × ½ n.s.

ing on median fins; in very juvenile specimens the spots are sometimes arranged in transverse regular series or united in stripes; head above rosy with brown stains in three tranverse series or united in three stripes; the fins in all ages rosy, gray, yellowish or brown; the membrane of the spinous dorsal often brown or with a brown margin. Length up to 300 mm.

Nomen indig. Kétang-Kétang, Kepper (Malay. Batavia); Kiper, Bindang (Javan.); Kittam (Serawak, Borneo); Kipar (Balikpapan, Borneo).

Habitat. Penang; Singapore; Riouw Arch.; Linga Arch.; Pulu Weh!; Sumatra (Telokbetong, Benkulen, Padang, Priaman, Siboga, Belawan!; Banjuasin, Pangabuang, Bagan Si Api Api, Palembang); Nias!; Simalur!; Java (Batavia!, Bantam, Cheribon, Tjilatjap, Karangbollong, Samarang!, Patjitan, Prigi, Surabaja!, Pasuruan, Besoeki!, Tamara, Japara); Madura; Bali; Lombok!; Timor; Borneo (Pontianak!, Stagen, Balikpapan!, Serawak). Celebes (Makasser!, Bulukomba, Klabat diatas, Menado!); Saleyer!; Halmaheira!; Batjan; Buru; Muna!; Buton!; Ceram!; Ambon!; Great Kei!; Aru Isl.; New Guinea (Lorentz River!, Fak Fak!, Merauke River, East coast!). — Delagoa Bay, British India, Ceylon, Malay Peninsula, Siam, Tonkin, South coast of China, Formosa, Philippines, North Australia, Queensland, New South Wales, New Pommern, Admirality Isl., New Hebrides, New Britain, New Caledonia!, Tahiti. In sea, brackish water of estuaries, entering freshwater of rivers and lakes.

2. **Scatophagus argus** var. **tetracanthus** (Lac.).

Chaetodon tetracanthus Lacépède, Hist. nat. Pois. IV, 1802, p. 727; III, Pl. XXV, fig. 2.

Catophagus fasciatus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 144.

Scatophagus tetracanthus Günther, Cat. Brit. Mus. II, 1860, p. 60.

Scatophagus fasciatus Guichenot, Mém. Soc. Sc. nat. Cherbourg XII, 1866, p. 145.

Scatophagus tetracanthus Playfair in Playfair & Günther Fish. Zanzibar, 1866, p. 39. — Proc. Zool. Soc. London 1868, p. 10.

Cacodoxus tetracanthus Bleeker, Enumer. Poiss. Madagascar, Leiden 1875, p. 94.

Scatophagus tetracanthus Macleay, Proc. Linn. Soc. N. S. Wales II, 1878, p. 353. — Descr. Cat. Austral. Fish. I, 1881, p. 96.

Scatophagus tetracanthus Sauvage, Poiss. Madagascar 1891, p. 516.

Ephippus tetracanthus Fowler, Proc. Acad. Nat. Sci. Philadelphia LXXVII, 1925, p. 250.

Scatophagus argus (var. *tetracanthus*) Barnard, Ann. S. Afric. Mus. XXI, 1925—27, p. 619.
Scatophagus (Desmoprenes) tetracanthus Fowler & Bean. Bull. U. S. Nat. Mus., vol. 8, 1929, p. 40.
Scatophagus tetracanthus Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 59.

This variety differs from *Sc. argus* only by the colouration. It has six rather broad vertical brown cross-bands: the first from the nape through eye, the second from before the first dorsal spine over the operculum, the third and fourth below the spinous dorsal, the fifth below middle of soft dorsal, the sixth across caudal peduncle. As there are specimens known up to 150 mm it is difficult to assume that it is a juvenile colouration.

Habitat: this variety is known from the East coast of Africa, from Madagascar and Port Darwin (Australia), wherefrom Macleay mentioned it. We have seen in the Amsterdam Museum two young specimens from the „eastern part of the Archipelago" and one from the „western part" (probably Java), the longest about 45 mm length. In the Leiden Museum is a specimen of 18 mm length from Celebes, collected by van Nouhuys. Otherwise it is, as far as we know, not recorded from the Archipelago.

3. **Scatophagus multifasciatus** Richards. (Fig. 6).

Scatophagus multifasciatus Richardson, Zool. Voyage Erebus & Terror 1844, p. 57.
Scatophagus multifasciatus Bleeker, van Diemensland p. 9, Verh. Akad. Amsterdam II, 1855. (name only).
Scatophagus multifasciatus Günther, Cat. Brit. Mus. II, 1860, p. 60.
Scatophagus multifasciatus Steindachner, Ichth. Notiz. VI, Sitzb. Akad. Wien LVI, 1867, p. 310.
Scatophagus multifasciatus Macleay, Proc. Linn. Soc. N. S. Wales II, 1878, p. 353.
Scatophagus multifasciatus de Castelnau, o. c. III, 1879, pp. 47, 376.
Scatophagus multifasciatus Klunzinger, Sitzb. Akad. Wien 1880, p. 363.
Scatophagus multifasciatus Macleay, Descr. Cat. Austral. Fish. I, 1881, p. 96. — Proc. Linn. Soc. N. S. Wales, VII, 1882, p. 244. — o. c. VIII, 1883, p. 203.
?*Scatophagus aetate - varians* De Vis. Proc. Linn. Soc. N. S. Wales IX, 1884, p. 456.
Scatophagus argus M. Weber, Nova Guinea V, 2, 1908, p. 249. (nec Bloch).
Scatophagus multifasciatus M. Weber, Abh. Senckenb. Naturf. Ges. XXXIV, 1911, p. 31.
Scatophagus multifasciatus Mc Culloch, Check list fish. N. S. Wales, Austral. Zoologist II, 1922, p. 90.
Scatophagus tetracanthus Fowler, Fish. Oceania, Mem. Bishop Museum X, 1928, p. 243.
Scatophagus (Desmoprenes) tetracanthus Fowler & Bean, Bull. U. S. Nat. Mus., vol. 8, 1929, p. 40 (p. p.).

The original description of this species by Richardson is as follows:

„CH. Spec. Sc. fronte concava ad nares gibba; dorso fasciis plurimis, nigris, transversis notato; lateribus maculatis; post singulas spinas pinnae dorsi analique vitto nigro.

Radii: — B. 6; D. 11 - 1, 16; A. 4, 16; C. 16; p. 17; V 1, 5.

Plate XXXV., figs. 4, 5, natural size; 6, magnified.

The body is much compressed, with a short, oblate-oval outline, beyond which the snout and trunk of the tail project. The summit of the back which is occupied by the spinous dorsal, and the opposite part of the belly, are bounded by nearly horizontal lines. The soft dorsal and anal occupy the whole of the posterior curves. The head forms nearly one-fourth of the whole length, caudal included, and the diameter of the orbit rather exceeds the fourth part of the length of the head. The border of the orbit is obtusely prominent at the upper anterior angle behind the nostril. The preorbitar is considerably wider than the rest of the suborbitar chain, and an obtuse notch is formed by their junction. The upper limb of the preoperculum is vertical, the corner shortly rounded, and the lower

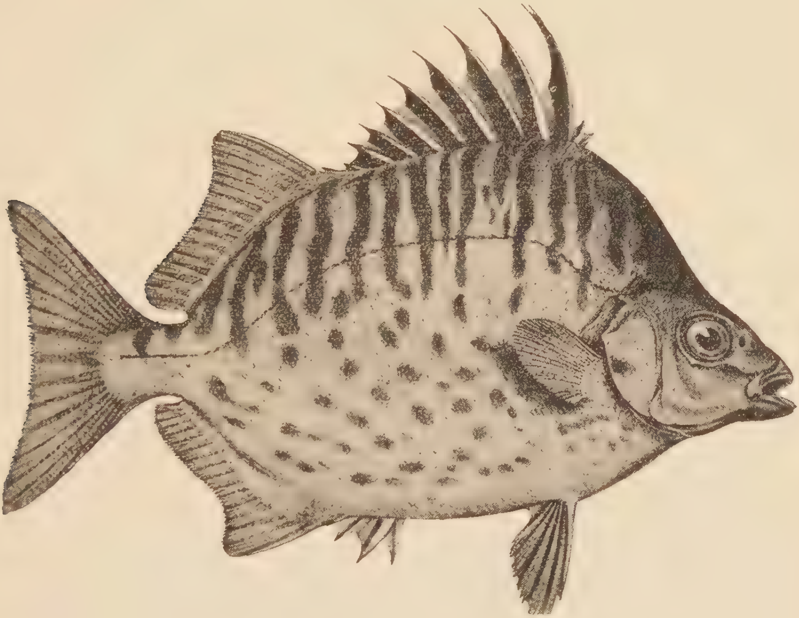

Fig. 6. *Scatophagus multifasciatus* Richards., After Richardson. n.s.

one completely overlies the interoperculum, only a small crescentic part of that bone showing behind the angle of the preoperculum. The edge af the gillcover is nearly an arc of a circle without any notch, but the upper corner of the operculum makes a scarcely visible prominence. It is rough with microscopical teeth.

The fine brush-like dental plates on the jaws are composed of closely set slender teeth, each of which is tricuspid, with the middle cusp taller than the lateral ones. There are no teeth on the roof of the mouth.

The scales are small and densely tiled, only a small oblique rhomboidal segment of the disk being visible, which is armed with several parallel acutely toothed ridges. The base is undulated, producing three or four indistinct lobes. The general form of the scales is semi-oval with one side shorter. The lateral line runs in the upper quarter of the height until it reaches the posterior third of the dorsal, when it takes a straight course through the middle of the tail.

The dorsal spines have their broad sides turned alternately to the right and left; the first two spines are short, and the third and fourth are the longest, the succeeding ones decreasing rapidly in height. The spine of the second dorsal is buried in its front, so that only its tip shows. The first and second anal spines are longer than the following two. The soft dorsal and anal are alike, both having a rounded lobe in front higher than the rest of the fin, and the posterior corner also rounded. The caudal is slightly crescentic. This fin and the soft dorsal and anal are rough with minute scales.

The specimen here described is a dried one, and the colours have consequently perished, but the scales retain a peculiar satiny lustre, and sixteen or eighteen narrow black bands remain visible on the back, descending a little below the lateral line, together with many with roundish spots on the sides. The top of the head and nape are dark, and there is a broad black stripe behind each dorsal spine, and also, but more faint, behind each anal spine. The soft dorsal and anal are also very finely edged with black, but the rest of the fins appear to be colourless.

This species differs in profile from the *Chaetodon tetracanthus* of Lacépède (III, pl. XXV., fig. 2, et iv. p. 727), or *Scatophagus fasciatus* C. et V. VII, p. 144. The vertical bands are of a different description, and there is no trace of the pectorals having been black.

Length of the specimen 10½ inches.

Hab. King George's Sound, Australia."

Habitat: New Guinea (Merauke!); Aru Islands!. — Australia (Port Darwin, Queensland, N. S. Wales; King George's Sound). New Caledonia (Borodin 1932). In sea and mouth of rivers.

Note: in our key on page 6 we have laid stress on the principal difference between *Scatophagus argus* (Bl.) and *multifasciatus* Richardson shown by the difference in form of the soft dorsal and anal fins in both species, not noticed by Richardson in his diagnosis but clearly visible in his figure. It was overlooked by Macleay but indicated in a few words by Mc Culloch. We have noticed that difference also by revising our specimens from the Aru Islands and from New Guinea. Those from the Lorentz River (New Guinea) have the soft dorsal and anal as described for *Sc. argus*. In those from the Aru Islands and Merauke (New Guinea) the middle rays are not the longest, the hindmargins are therefore not rounded but rather somewhat concave and extending obliquely forward as a comparison of the figures of *argus* and *multifasciatus* will clearly show.

2. Subfam. CHAETODONTINAE.

Head and body strongly compressed, more or less elevated, oval, orbicular or subrhomboid, covered with usually finely ciliated, otherwise smooth scales of large, moderate or small size, differently arranged on trunk and, in diminishing size present on head, generally on chest and densely continued on dorsal and anal fins, at least on their soft parts, concealing the limit between body and base of fins. Lateral line more or less strongly arched, concurrent with outline of back or angulate, terminating at base of caudal or below or somewhat before extremity of dorsal fin 1). Head small without its usually prolonged or prominent snout, about as high as long. Preoperculum entire or denticulate, in adult without an angular spine. Gillmembranes attached to narrow isthmus, 6 (7) branchiostegals, gillrakers short, pseudobranchiae large. Mouth small, terminal, protractile. Jaws with usually equal, fine setiform teeth in brush-like bands, often long and prominent, by exception more or less rudimentary, those on vomer and palatines usually wanting. Dorsal continuous

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1) Fowler & Bean (Bull. U. S. Nat. Mus., vol. 8, 1929, p. 41) say about the lateral line, that it does not reach the caudal fin. This is an error, at least in *Forcipiger, Chelmon, Coradion, Microcanthus, Hemitaurichthys, Heniochus* it reaches to base of caudal fin. Only in *Chaetodon* sensu lato it is incomplete.

with VI—XVI movable spines, the first not procumbent, the fourth prolonged in one genus, and 15-30 rays, some of which may be prolonged and setiform; anal with III-IV (V) spines and 15-23 rays; caudal truncate, rounded or emarginate with 15 divided rays; ventrals thoracal with a spine and 5 rays and an axillary scaly process.
The young passing through a Tholichthys-stage. For other characters see those of the family.

Distribution: Marine littoral fishes of small or medium size, conspicuous by their remarkable forms and brilliant colours; limited to warm water of all tropical seas, inhabiting especially coral reefs; feeding on small animals. Mostly of no market value.

The various species of indo-pacific Chaetodontinae, also after removal of the genera *Chelmon* and *Heniochus* by Cuvier and some other small genera of later date, have to the present essentially continued to be united in the genus *Chaetodon* of Linnaeus. The majority of these fishes are in life brightly coloured and strongly and chracteristically patterned and thereby specifically easy to distinguish, but their pattern is easier to depict than to describe in a short way, and if they are described, as in our and in most cases, as seen in spirit-specimens in which some of the colours are apt to fade, an artificial arrangement of them on the base of colour and pattern is systematically unsatisfactory. A less artificial method of systematisation is hampered by their morphological uniformity. It has repeatedly been tried by various authors; the least unsatisfactory one seems to be that of Bleeker using the squamation as principal base of discrimination. It has been used after him in different extent in the elaborate papers of Ahl, Herre & Montalban, Fowler & Bean. We have followed it in its main points but with the improvements of Klunzinger and with the addition of some neglected characters.

As in some genera the lateral line is arched or angulate and not complete and as the count of scales in a horizontal line from operculum to caudal is of taxonomic importance, we have given the number of these scales under the name L. r. (= linea recta) in stead of the lateral line; the linea transversa is counted between ventrals and origin of dorsal.

Key to the indo-australian genera of *Chaetodontinae*

A. Rostral part of head produced into a long, narrow tube by excessive horizontal prolongation of intermaxillaries and mandibles, united by skin over two thirds of their length, at the top with a narrow terminal mouth opening. Scales small, finely ciliated; lateral line reaching caudal. Anal spines III.

1. Velvet-like band of minute teeth in jaws. Dorsal XII—XIII, 22—23. Pectorals long, falcate . . . . 1. *Forcipiger* p. 16.
2. Teeth small, pointed, forming several brush-like bands. Dorsal IX, 26—31. Pectorals rather short, acutely rounded . . . . . . 2. *Chelmon* p. 18.

B. Snout more or less conical, of medium or small extension, not prolonged into a tube, intermaxillaries and mandibles small, normal. Scales ctenoid, small, moderate or large, lateral line complete or incomplete. Anal spines III—V, usually III.

- I. Scales small, more than 55 in a horizontal series from operculum to caudal; lateral line reaching caudal.
  - 1. Teeth subequal, rather long, pungent, pluriseriate. Dorsal XI, 17. Preoperculum strongly dentate . . . . 3. *Microcanthus* p. 22.
  - 2. Teeth small, setiform, brush-like. Dorsal XII, 24. Preoperculum weakly serrate. . 4. *Hemitaurichthys* p. 24.
  - 3. Teeth minute, concealed by swollen, plicated lips reducing the mouth to a round or oval minute opening. Dorsal VIII—X, 25—30. Preoperculum serrate. . . . . 5. *Coradion* p. 27.
- II. Scales on trunk moderate or large, less than 55 in a longitudal series; lateral line terminating before or near end of dorsal. Teeth setiform, in brush-like bands.
  - 1. Dorsal with VI, rather weak spines, gradually increasing in height posteriorly, the last much shorter than the first of the 28—29 dorsal rays, gradually decreasing in height posteriorly (Platax-like). 6. *Parachaetodon* p. 32.
  - 2. Dorsal with XI—XIII strong spines, usually not graduated, but the middle ones highest, the last about equal to first dorsal ray.
    - *a*. Fourth dorsal spine prolonged. Preoperculum entire. With or without an osseous prominence on nape. Dorsal XI—XII, 22—27. Anal III, 17—19. 7. *Heniochus* p. 35.
    - *b*. None of dorsal spines prolonged. Nape without osseous prominence.
      - *α*. Scales on trunk mostly rhombic, upper transverse series obliquely directed upwards, lower downwards, meeting in about middle of height in an angel directed forward.

α^1. Scale-series meeting in obtuse angel. D. XI, 26-28. A. III, 21-23. 8. *Gonochaetodon* p. 47.

β^1. Scale-series meeting in acute angel. D. XIV, 15—17. A. IV (—V), 15—16. . . . . 9. *Megaprotodon* p. 50.

β. Scales uniform, with regularly rounded posterior border, on trunk larger, their longitudinal series in upper half of body horizontally arranged, likewise in lower half or here posteriorly slightly or strongly upward inclined. Lateral line arched or angulate not reaching caudal. Linea recta 50 or less D. XI—XIV, 17—19 to 25—27; occasionally some of the anterior rays are prolonged; A. III, by exception IV—V, 15—17 to 23—24 . . . . 10. *Chaetodon* p. 52.

γ. Two kinds of ciliated scales: large rhombic ones, their posterior border with unequal sides forming an obtuse angel, at least on anterior part of trunk, and much smaller, regularly rounded ones elsewhere. The longitudinal rows of the larger ones are less distinct, the transverse ones very pronounced. D. without prolonged rays; A. always with III spines, Lateral line arched, incomplete. . . . . 11. *Anisochaetodon* p. 94.

1. **Forcipiger** (Jordan & Mc Gregor) Jordan & Evermann.

(Jordan & Evermann, Bull. U. S. Nat. Mus. 47, pt. 2. 1928, p. 1671).

Strongly compressed, elevated, subrhomboid. Head with a deep rostro-frontal cancavity; its rostral part produced into a long, narrow tube, closed by excessive horizontal prolongation of intermaxillaries and mandibles, united by skin over two third of their length, at the top with a narrow terminal mouth opening. Head and body covered with rather small ctenoid scales, gradually diminishing in size posteriorly, forming a high basal sheath on dorsal and anal fins and continued on the interradial membrane. Lateral line concurrent with outline of back, extending to base of caudal. Free part of jaws covered with a velvetlike band of minute teeth. Preoperculum and preorbital slightly denticulate. Dorsal continuous with XII to XIII strong, high spines and 22 to 24 rays; anal with III strong spines, the third the longest and 18-19 rays; pectorals long, falcate;

ventrals with a strong spine and 5 rays, the first prolonged; an axillary scalelike process present; caudal emarginate.

Distribution: that of the single species known.

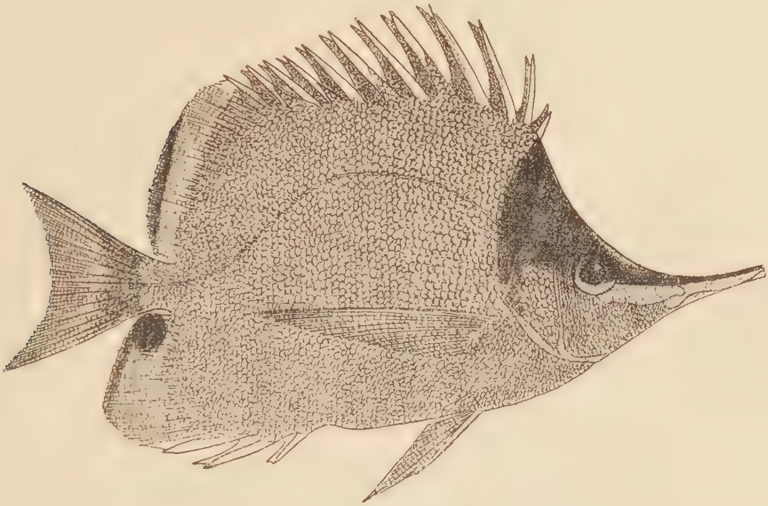

Fig. 7. *Forcipiger longirostris* (Broussonet) × $^3/_4$.
Lower part of caudal less strongly concave.

1. **Forcipiger longirostris** (Broussonet) (Fig. 7).

Chaetodon longirostris Broussonet, Ichth. Decas I, 1782, p. 6, tab. 7.
Chelmon longirostris Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 89.
Chelmon longirostris Bleeker, Verh. Batav. Gen. XXIII (1849) 1850, Rév. Chaetodont, p. 20.
Chelmon lol Montrouzier, Ann. Sc. phys. Soc. d'Agricult. Lyon VIII, 1856, p. 444.
Chelmo longirostris Günther, Cat. Brit. Mus. II, 1860, p. 38. — Fische Südsee 1873, p. 48.
Chelmo longirostris Bleeker, Poiss. Madagascar 1875, p. 95.
Prognathodus longirostris Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877, Chaetodont. p. 33. — Atl. ichth. IX, 1877, p. 23.
Chelmo longirostris Macleay, Cat. Austr. Fish. I, 1881, p. 92.
Forcipiger flavissimus (Jordan & Mc Gregor) Jordan & Evermann, Bull. U. S. Nat. Mus. 47, 1898, p. 1671.
Forcipiger longirostris Fowler, Proc. Acad. Nat. Sci. Philadelphia 1900, p. 512.
Forcipiger longirostris Jordan & Seale, Bull. Bur. Fisheries XXV, 1906, p. 336 1).

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1) In this opus *F. flavissimus* from Clarion Is. is united with the present species.

Forcipiger longirostris Ahl, Arch. f. Nat. Gesch. LXXXIX, 1923, p. 8.
Forcipiger longirostris Herre & Montalban, Philipp. Journ. Sci. XXXIV, 1927, p. 16.
Forcipiger longirostris Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 259.
Forcipiger longirostris Fowler & Bean, Bull. U. S. Nat. Mus., vol. 8, 1929, p. 45.

D. XII—XIII, 22—23; A. III, 18; L.r. about 60; l.tr. $\frac{12}{30}$.

Height 1.12-1.5; head 2.2-2.3 in length. Snout more or less than twice in head, increasing in length with age. Eye 5.25 to about 6 in head. Rostro-dorsal outline deeply concave, strongly ascending to dorsal fin. Preorbital and preoperculum denticulate. Dorsal spines rapidly increasing in height, the two anterior short, the fourth, fifth and sixth highest; rayed dorsal rounded, much shorter than spinous part, decreasing in height posteriorly. Anal with three strong spines, the third usually somewhat longer than the second, rayed part obtusely rounded, higher than rayed dorsal. Pectorals falcate, about twice longer than head without snout. Ventrals acute, much shorter than pectorals, with the spine about equal to head without snout, the first ray prolonged. Caudal slightly concave, its upper part somewhat longer; caudal peduncle 13 to 14 times in length. For other characters see those of genus. Colour yellowish, head and thoracal part dark or light reddish, a still darker triangular blotch from origin of dorsal to base of pectorals, continued through eye to dorsal surface of snout; fins yellowish, paired fins and caudal often with a blue hue, posterior angel of soft anal with a round black spot, smaller than eye. Length till 160 mm.

Habitat: From East coast of Africa, Madagascar, Mauritius to China (Tsingtau) and through Indo-pacific to Clarion and Socorro Isls., but everywhere rare and wanting in many intermediate localities f. i. in India. In our region not known from Sumatra itself, nor from Java, Borneo and Celebes but known from Pulu Weh (Sabang Bay)!; Christmas Is. [Regan]; Flores!; Sula Ild.!; Banda!; Ambon!; Nusa laut; Ternate; Ceram (Wahai!); Misol; Kisser!; Timor!; New Guinea. — Philippines, Queensland, Melanesia, Micronesia, Polynesia, Hawai. Seems to be restricted to coral reefs and rocky coasts of similar biological character.

2. **Chelmon** Cloquet.

(Cloquet, Dict. Sc. nat. VIII, 1817, p. 370; ex „Chelmons” Cuvier, Règne anim. II, 1817, p. 334).
Chelmo Schinz, Thierreich, II, 1822, p. 532.
Chelmon Cuvier & Valenciennes, Hist. Nat. Poiss. VII, 1831, p. 86.

Body compressed, subrhomboid, dorsal outline strongly curved.

Frontal outline of head abruptly ascending to dorsal fin, its rostral part produced into a long pointed snout, ending in a narrow tube by horizontal elongation of intermaxillaries and mandibles, united by skin over two third of their length and terminating in a rather small horizontal mouth opening. Moderate cycloid scales, gradually somewhat diminishing in size on head, towards tail and dorsal and anal fins, which they densely cover, only the tops of the spines leaving free. Lateral line concurrent with the curvature of the back, terminating at base of caudal. Free part of jaws covered with series of small, pointed teeth forming brush-like bands; palate edentulous. Preorbital and preoperculum slightly denticulate. Dorsal continous, with 9 strong spines increasing in size backwards and 26-31 rays, forming an acutely rounded soft part, nearly twice longer than spinous part; anal with III spines, the third the longest, and 17—21 rays forming a rounded fin; pectorals acutely rounded, rather short; ventrals with a strong spine and 5 rays, the first elon-

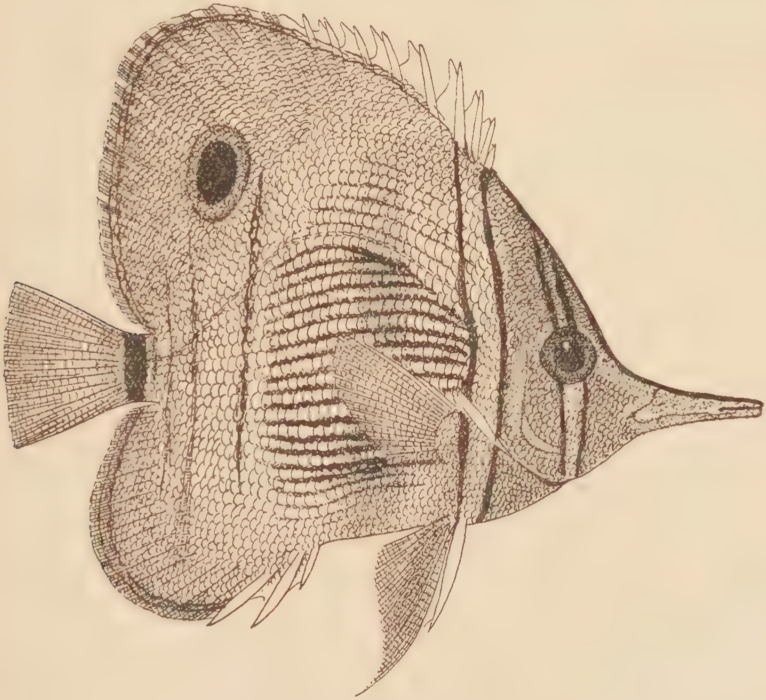

Fig. 8. *Chelmon rostratus* (L.) × 4/5.

gated; an axillary scalelike process present; caudal rounded. For other characters see those of the subfamily.

Distribution: From East coast of Africa and Mauritius to India, Malacca, China, through Indo-Australian Archipelago to Northern Australia. In sea.

Note: We have stated on p. 195, when exposing the faculty of *Toxotes* to catch insects by shooting a drop of water at them, that originally *Chaetodon rostratus* L. *(Chelmon rostratus)* was credited with this faculty: the first authors confounding this fish with *Toxotes*, being decived by the tubular elongation of the snout and wrongly supposing that it frequented also fresh water. Even *Cuvier* & *Valenciennes* ascribed this faculty of *Toxotes* also to *Chelmon*, an assumption repeated again by *Day* (Fish. India 4° 1878, p. 109 but expressly refuted by *Bleeker* in 1877, who drew attention to the fact, that *Chelmon* is restricted to coral reefs and does not enter the mouth of rivers. As it is a reef dweller it misses the opportunity to meet insects, without mentioning the construction of the mouth which is quite different from that of *Toxotes*.

1. **Chelmon rostratus** (L.) (Fig. 8).

Chaetodon rostratus Linnaeus, Syst. nat. edit. Xa, 1758, p. 273.
Chaetodon rostratus Bloch, Ausl. Fische III, 1787, p. 78. — Bloch, Schneider, Syst. Ichth. 1801, p. 221.
Chaetodon enceladus Shaw & Nodder, Nat. Miscell. 1791, p. 2.
Chaetodon rostratus Shaw, Gen. Zool. Pisces IV, pt. II, 1803, p. 337.
Chelmon rostratus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 87.
Chelmon rostratus Bleeker, Nat. Geneesk. Arch. Ned. Indië (3), II. 1845, p. 520. — Verh. Batav. Gen. XXIII (1849) 1950, Chaetod. p. 20.
Chelmon rostratus Cantor, Journ. Asiat. Soc. Bengal XVIII, (1849) 1850, p. 1140.
Chelmon rostratus Montrouzier, Ann. Sc. phys. Soc. d'Agriculture Lyon, (2) VIII; 1856, p. 444.
Chelmo rostratus Günther, Cat. Brit. Mus. II, 1860, p. 36.
Chelmo rostratus Kner, Fische Novara, 1865—1867, p. 103.
Chelmon rostratus Jouan, Mém. Soc. Sc. nat. Cherbourg. (2) XII, 1866, p. 123.
?*Chelmo pulcher* Steindachner, S. B. Akad. Wien, 1874/75, p. 382.
Chelmon rostratus Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877. Rév. Chaetodont. p. 30. — Atl. ichth. IX, 1877, p. 22.
Chelmo rostratus Day, Fish India 4° 1878—88, p. 113.
Chelmo rostratus Macleay, Descr. Cat. Austral. Fish. I, 1881, p. 91.
Chelmon rostratus Jordan & Seale, Bull. Bur: Fish. XXVI, (1906) 1907, p. 33.
Chelmon rostratus Mc Culloch, Check list fish. N. S. Wales III, Austral. Zoologist II, pt. III, 1922, p. 91.
Chelmon rostratus Fowler & Bean, Proc. U. S. Nat. Mus. vol. 62, 1922, p. 56.
Chelmon rostratus Herre & Montalban, Philipp. Journ. Sci. 34, 1927, p. 14.
Chelmo rostratus Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 259.
Chelmo rostratus Fowler & Bean, Bull. U. S. Nat. Mus., vol. 8, 1929, p. 42.
Chelmo rostratus Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 59.

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D. IX, 26—31; A. III, 17—21; Sq. lat. 48—50; ltr. $\frac{9-10}{22-23}$.

Height 1.5-1.7 head 2.2-2.3 in length; snout twice to thrice longer than eye, which goes 4-5 times in head. Rostro-dorsal outline of head concave before eye, abruptly ascending in a rounded line to origin of dorsal. Dorsal spines gradually increasing in size to the last, which goes more or less than twice in head; rayed part of dorsal much longer than spinous part, middle rays highest, posterior part angular; anal with the two posterior spines very strong, the last somewhat the longest, the rayed part rounded; caudal convex; pectorals acutely rounded, 1.5 to nearly twice in head; ventrals pointed, the first ray may be produced, their spine about equal to third anal spine. Least height of caudal peduncle more than 9 times in length of body. Groundcolour yellowish white with four yellow to reddish brown transverse bands, edged with brown and white on head and body: the first from front through eye to throat, the second from origin of dorsal to ventral, the third from spinous dorsal to origin of anal, the fourth, the broadest, from soft dorsal to soft anal and broadened on both fins, a fifth darker band round caudal penduncle; a similar frontal stripe running to top of snout; on base of soft dorsal a blue-black round spot with a narrow white border; longitudinal rows of scales with a darker line; fins yellowish, soft dorsal and anal with an intramarginal narrow light band. For other characters see those of the genus. Length 170 mm.

Nom. indig. Kipper-laut (Malay, Batavia.).

Habitat: Singapore!; Riouw Archipelago!; Bangka!; Lepar; Sumatra (Telok betong, Benkulen); Java (Batavia!, Japara, Bantam); Bintang!; Duizend Isl.; Borneo!; Bawean; Adonara!; Celebes (Makassar!); Ambon!; Banda; Aru Isl.!; Sorong; New Guinea. — Mauritius, India, Malacca, Pulo Condor, Philippines, Woodlarke, North Australia.

Note: The Australian species *Chelmon marginalis* Richardson (Ann. Mag. Nat. Hist. X, 1842, p. 29) from Port Essington and *Chelmon Mülleri* Klunzinger (S. B. Akad. Wien 1880, p. 361) from Northern Australia, are dubious as to their specific status and by later authors (Ahl, Fowler & Bean, Whitley) regarded as subspecies or even synonyms of *Ch. rostratus* (L.).

3. **Microcanthus** Swainson.

(Swainson, Nat. Hist. of Fishes 1839, p. 215).
Therapaina Kaup, Arch. f. Naturgesch. XXVI, 1860, pp. 139, 140.
(no diagnosis).

Compressed, oval, covered by small ctenoid scales, 55—60 in a regular horizontal series, present also on soft dorsal and anal, lateral line arched, continued on caudal peduncle to base of caudal. Eye large, its diameter longer than rather blunt snout. Mouth small, terminal, jaws equal with sharp subequal teeth in a rather broad band, non on vomer, palatines or tongue. A slit between cutaneous covering of mandibular branches and gular skin. Gillmembranes united, forming a fold across isthmus. Preoperculum and preorbital serrate. Spinous dorsal longer than soft dorsal; dorsal X—XI, 16—17; anal III, 13—14. Caudal concave.

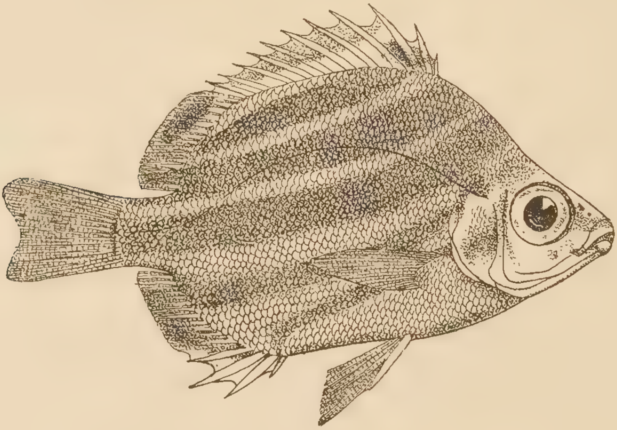

Fig. 9. *Microcanthus strigatus* (C. V) n. s.

Distribution: That of the single species known.

1. **Microcanthus strigatus** (C. V.). (Fig. 9).

Chaetodon strigatus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 25, (apud Langsdorf).
Chaetodon strigatus Schlegel, Poiss. Fauna Japonica 1844, p. 80.
Chaetodon strigatus Richardson, Report Ichth. China, Brit. Assoc. (1845) 1846, p. 246.
Chaetodon strigatus Bleeker, Verh. Batav. Gen. XXVI, 1854—57, Ichth. Japan, p. 94.
Chaetodon strigatus Günther, Cat. Brit. Mus. II, 1860, p. 30.
Chaetodon strigatus Kaup, Ned. Tijdschr. Dierk. I, 1863, p. 125.

Chaetodon strigatus Steindachner, Sitzb. Akad. Wien LIII, 1866, p. 435.
Neochaetodon vittatus Castelnau, Proc. Zool. Acclim. Soc. II, 1873, p. 130. — Proc. Linn. Soc. N. S. Wales III, 1879, p. 375.
Chaetodon strigatus Günther, Fische Südsee 1873—75, p. 47.
Therapaina strigata Bleeker, Arch. Néerl. Sc. Nat. XI, (1875) 1876, p. 298.
Chaetodon strigatus von Martens, Preuss. Exp. Ost-Asien 1876, p. 388.
Microcanthus strigatus Bleeker, Versl. Akad. Amsterdam XVIII, (1877) 1878, p. 8.
Chaetodon strigatus Macleay, Descr. Cat. Austral. Fish I, 1881, p. 87.
Chaetodon strigatus Nyström, Bihang Svensk. Akad. Handl. XIII, Af. IV, 1887, p. 18.
Chaetodon strigatus Ogilby, Mem. Austral. Mus. II, 1889, p. 55.
Hemitaurichthys strigatus Steindachner, Ann. Hofmus. Wien XI, 1896, p. 202.
Chaetodon strigatus Waite, Rec. Austral. Mus. IV, 1902, p. 189.
Microcanthus strigatus Jordan & Evermann, Proc. U. S. Nat. Mus. XXV, 1902, p. 357.
Microcanthus strigatus Jordan & Fowler, Proc. U. S. Nat. Mus. XXV, 1902, p. 541.
Microcanthus strigatus Jenkins, Bull. U. S. Fish. Comm. XXII, (1902) 1904; p. 474.
Microcanthus strigatus Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII, (1903) 1905, p. 376.
Microcanthus strigatus Jordan & Starks, Proc. U. S. Nat. Mus. XXX, 1906, p. 699.
Microcanthus strigatus Snyder, Proc. U. S. Nat. Mus. XLII, 1912, p. 510.
Microcanthus strigatus Jordan, Tanaka & Snyder, Journ. Coll. Sci. Tokyo XXXIII, 1913, p. 213.
Microcanthus strigatus Mc Culloch, Biol. Results „Endeavour" IV, 1916, p. 193.
Microcanthus strigatus Alexander, Journ. Linn. Soc. London, XXXIV, No. 230, 1922, p. 482.
Microcanthus strigatus Mc Culloch, Check List Fish N. S. Wales III, Austral. Zoolog. II, 1922, p. 91.
Microcanthus strigatus Ahl, Arch. f. Naturg. LXXXIX, 1923, p. 22.
Microcanthus strigatus Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 72.
Microcanthus strigatus Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 256.
Microcanthus strigatus Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 144.

D. XI, 16—17; A. III, 13—14; L. l. ca 55—60; L. tr. 10/25.

Compressed, oval, dorsal profile strongly convex, rosto- dorsal profile nearly straight till above eye, thence convex till dorsal; height about 1.8, head pointed 2.8 to thrice in lenght. Eye somewhat oval, large, for its greatest part in anterior half of head, nearly thrice in its length, eye diameter longer than flattened and slightly convex interorbital space and little longer than short bluntly pointed snout, with rather thick lips. Maxillary rather long, distally extended to below anterior nostril or below frontborder of eye, the lower border of which is on level with tip of mouth. Mouth small, terminal, oblique; teeth subequal, sharp, pointed, in rather broad bands, none on vomer and palate. Preoperculum rather strongly dentate on its posterior border and on more or less rounded angel. Scales small, in regular horizontal series, forming a low basal sheath for spinous dorsal, a high one on soft dorsal and anal; lateral line arched till middle of caudal peduncle thence continued in a straight line to caudal. Spinous dorsal about the distance of four spines longer than soft, the spines strong, rapidly increasing in size till about fourth, which goes more than 1.5 in head, thence slightly decreasing till last which has nearly height of rounded soft dorsal; anal likewise rounded, its second spine the strongest and longest, more than 1.7 in head. Pectorals equal head without snout; ventrals likewise, nearly reaching anal with their first ray. Caudal concave, rather long, least height of its peduncle equal diameter of eye. Colour in alcohol grayish to yellowish, sides crossed by five oblique brown bands, the upper ones broader than interspaces, the first below base of dorsal, the second from nape to end of soft dorsal, the third from neck to caudal peduncle, the fourth from front to soft anal, the fifth from snout through eye, crossing base of pectoral and continued on front part of soft anal, membrane of spinous dorsal likewise with a brown band terminating in an oval patch on anterior rays of soft dorsal, underside of head and chest silvery; pectorals and caudal pale brown, ventrals with darker tip. The ocular or fifth band may show some variety in its course. Length up to 140 mm.

Habitat: We have in the old collection of the Amsterdam Museum a specimen without locality but probably from the Archipelago. Its occurrence there is not improbable as the species is known from China, Japan, Riu Kiu Isl., Formosa, probably the northern Philippines, Australia (Queensland, New South Wales, Western Australia), Abrolhos Isl., Lord Howe Isl., Hawaiian Isl. — The gap in the chain in its distribution from North to South would be filled by its presence in the Archipelago.

4. **Hemitaurichthys** Bleeker.

(Bleeker, Arch. néerl. Sc. nat. XI (1875) 1876, p. 304).

Elliptical; covered by small, rounded, ctenoid scales, on trunk arranged in longitudinal series, about 60 in a median nearly horizontal row (linea recta), minute on median fins. Lateral line concurrent with outline of back, continued on caudal peduncle to convex caudal. Snout short pointed, little produced, gape of mouth very small, teeth in jaws small, in short brushlike bands. Preoperculum weakly denticulate at angel. Orbit rugose. Spinous dorsal somewhat longer than soft dorsal; dorsal (X) XI—XII, 24—25, middle spines strongest and highest, not prolonged; anal III, 19—21; soft dorsal and anal rounded.

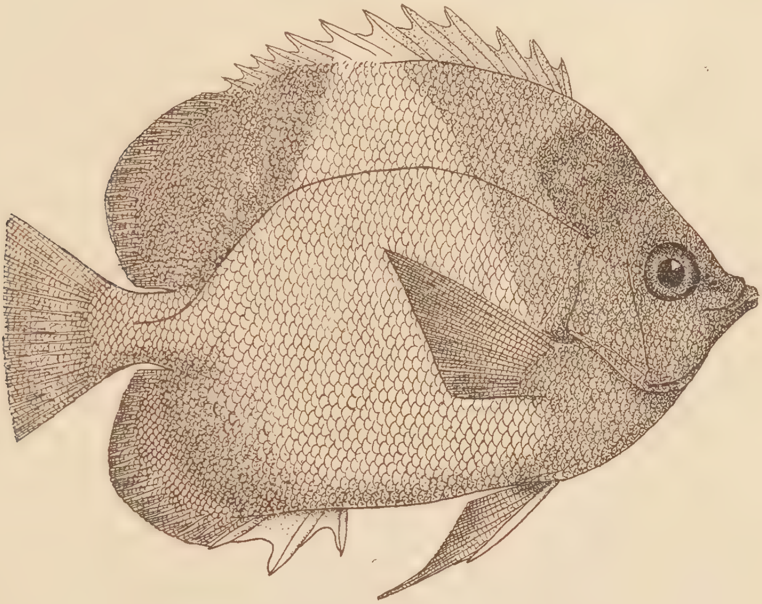

Fig 10. *Hemitaurichthys zoster* (Bennett). × 4/5.

Distribution: that of the single known species and its colour varieties.

1. **Hemitaurichthys zoster** (Bennett). (Fig. 10).

Chaetodon zoster Bennett, Fish. Mauritius in Proc. Comm. Zool. Soc. London 1831, p. 61.

Chaetodon polylepis Bleeker, Act. Soc. Sc. Indo-Neerl. II, 1857, p. 54.

Chaetodon zoster Günther, Cat. Brit. Mus. II, 1860, p. 33.

Chaetodon polylepis Günther, loc. cit. p. 35.

Tetragonopterus polylepis Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 270. — loc. cit. II, 1865, p. 286.

Hemitaurichthys polylepis Bleeker, Arch. Néerl. Sc. Nat. XI, (1875) 1876, p. 304. — Versl. Akad. Amsterdam (2) X, 1876, p. 316.

Chaetodon zoster Peters, Monatsber. Akad. Berlin 1876, p. 437.

Hemitaurichthys polylepis Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877, Rév. Chétodont. p. 50. — Atl. ichth. IX, 1877, p. 31. — Arch. Néerl. Sc. Nat. XIII, 1878, p. 44.

Hemitaurichthys zoster Bleeker, Verh. Akad. Amsterdam XVIII, (1877) 1878, Poiss. Maurice, p. 14.
Hemitaurichthys polylepis Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 37.
Hemitaurichthys zoster Ahl, loc. cit. p. 38.
Hemitaurichthys polylepis Fowler, Occ. Papers Bishop Mus. VIII, 1923, p. 384.
Hemitaurichthys thompsoni Fowler, ibidem.
Hemitaurichthys polylepis E. K. Jordan, Proc. U. S. Nat. Mus. LXVI, 1925, p. 22.
?*Hemitaurichthys thompsoni* E. K. Jordan, ibidem. (name only).
Hemitaurichthys polylepis Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 73.
Hemitaurichthys zoster Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 257.
?*Hemitaurichthys thompsoni* Fowler, ibidem.
Hemitaurichthys zoster, Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 143.
?*Hemitaurichtthys thompsoni* Fowler & Bean, ibidem.

D. XII, 24—25; A. III, 19—21; L. r. ca 60; L. tr. $\frac{14}{30}$.

Strongly compressed, orbicular to elliptical, dorsal outline more convex than ventral, rostro-dorsal profile concave above snout thence in a steep, slightly convex line ascending till dorsal; height 1.5—1.6, head 3—3.4 in length, somewhat shorter than high. Eye about midway in head, situated about in horizontal through commencement of gape of mouth, 3—3.2 in head, shorter than snout and about equal to strongly convex interorbital space. Snout pointed, thrice or less in head; mouth terminal, nearly horizontal, small with short, brushlike teeth. Preoperculum rectangular, weakly serrate at angel. Scales small, somewhat decreasing in size on head and caudal peduncle, minute on sheath of soft dorsal and anal, which is low on spinous dorsal; lateral line arched, continued on caudal peduncle and terminating at caudal. Spinous dorsal with incomplete membrane, about the distance of the three anterior spines longer than the rounded soft dorsal, middle spines strong, higher than the others, the last as high as anterior rays; anal likewise rounded, its third spine at most 1.5 in head. Pectorals about as long as head; first ray of acute ventrals longer, reaching anal, their spine about as long as head without snout. Caudal slightly convex, least height of its peduncle longer than eye. Colour in alcohol yellowish; head till anterior dorsal spines and breast brown, a large oval or somewhat triangular brown patch extending from about seventh spine on soft dorsal down to lateral line; a similar patch on soft anal and adjacent parts; the extension of this brown marking varies greatly and fades easily; paired fins brownish. Length up to 150 mm. [Specimen of Bleeker's collection seen by us].

Habitat: Pulu Weh!; Ambon!; Timor!; New Guinea. — Philippines, Mauritius, Hawaii.

Note: Bleeker, who created *Chaetodon* (*Hemitaurichthys*) *polylepis* in 1857, was also the first to indicate, in his revision of the Chaetodontidae in 1876, the probability of its identity with *Chaetodon zoster* Bennett (1831) in which case it ought to take that name, an opinion also adopted by later authors f. i. Fowler and Bean.

5. **Coradion** Kaup.

(Kaup. Arch. f. Naturgesch. XXVI, 1860, p. 146).

Compressed, more or less orbicular, dorsal outline more elevated than ventral, covered with rounded scales of medium size, smaller on head, chest and median fins; lateral line more or less strongly curved, reaching to base of caudal. Rim of orbit finely serrated, dorsally somewhat covered by a laterally prominent slight intumescence of the convex interorbital space. Snout rather short, blunt;

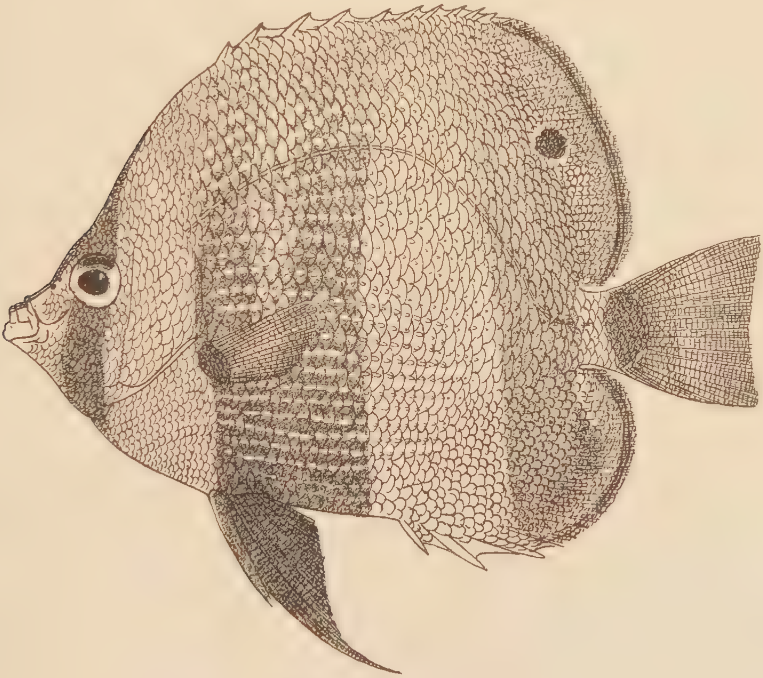

Fig. 11. *Coradion chrysozonus* (C. V.) × 5/7.

lips thick, swollen and somewhat plaited, reducing the mouth to a narrow, rounded or oval opening. Teeth more or less rudimentary, none on palate. Preorbital and preoperculum slightly serrated. Dorsal with VIII—X spines, evenly graduated to the last or the three or four middle ones the longest and strongest; soft dorsal evenly rounded or its posterior two thirds with vertical margin and 25—30 rays. Anal of similar construction, its three spines rather weak or strong, the first the shortest. Pectorals acutely rounded; ventrals obtuse or the first ray prolonged, their spine long; caudal somewhat sub truncate.

Distribution: The few species are small, marine, littoral fishes limited to the Indo-australian Archipelago, the neighbouring parts of Melanesia, the Philippines and the southern parts of China and Japan.

Key to the indo-australian species of Coradion.

1. Spinous dorsal about twice shorter than soft; VIII—X, usually IX spines; evenly graduated to the last; soft dorsal and anal evenly rounded; ventrals pointed, the first ray prolonged, reaching third anal spine; soft anal without ocellus . . . . . . 1. *chrysozonus* p. 28.
2. Spinous dorsal about one quarter shorter than soft; X spines, three to four median much longer and stronger than the preceeding and sequent; soft dorsal and anal in their posterior two thirds vertical; ventrals obtuse, reaching first anal spine; soft anal with an ocellus. . . . . 2. *melanopus* p. 30.

1. **Coradion chrysozonus** (C. V.) (Fig. 11).

Chaetodon chrysozonus Cuvier & Valenciennes, Hist nat. Poiss. VII, 1831, p. 82 (apud Kuhl & v. Hasselt).

Chaetodon labiatus Cuvier & Valenciennes, l.c. p. 83 (apud Kuhl & v. Hasselt).

Chaetodon labiatus Bleeker, Nat. Geneesk. Arch. Ned. Indië (3) II, 1845, p. 520 (name only).

Chaetodon chrysozonus Bleeker, Verh. Bat. Gen. XXIII (1849) 1850, p. 17. — Act. Soc. Sc. Indo-Neerl. VIII, 1860, p. 34.

Chaetodon chrysozonus Günther, Cat. Brit. Mus. II, 1860, p. 34.

Coradion chrysozonus Kaup, Arch. Naturgesch. 1860, p. 146.

Tetragonopterus chrysozonus Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 286.

Chaetodon chrysozonus Kner, Fische Novara-Exped. 1865—67, p. 101 (p.p.).

Coradion chrysozonus Bleeker, Arch. Néerl. Sc. Nat. XI (1875) 1876, p. 304. — Atl. ichth. IX, 1877, p. 25 tab. (14) 376, fig. 5 (nec 4). — Arch. Néerl. Sc. Nat. XIII, 1877, p. 44.

Coradion chrysozonus M. Weber, Fische Siboga-Exped. 1913, p. 309.

Chaetodon chrysozonus Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, p. 55.
Coradion chrysozonus Ahl, Arch. Naturgesch. LXXXIX, 1923, p. 40.
Coradion chrysozonus Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 70.
Chaetodon chrysozonus Duncker & Mohr, Mitt. Zool. Mus. Hamburg XLIV. 1929, p. 73.
Coradion chrysozonus Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 255.
Coradion chrysozonus Fowler & Bean, Bull. U. S. Nat. Mus., vol. 8, 1929, p. 49.
Coradion chrysozonus Herre, Notes Fish. Zool. Mus. Stanford Univ., 1931, p. 59.

D. XIII—X (usually IX), 27—29; A. III, 19—21; L. l. 42—44; L. r. 37—39; L. tr. $\frac{10—12}{20—21}$.

Compressed, semiorbicular, dorsal profile more elevated than ventral. Height 1.4—1.6, head slightly more or less than 3 in length; rostro-dorsal profile concave before eye, thence convex. Eye 3.5—3.9 in head, about equal to slightly convex interorbital space, which forms a slightly swollen prominence laterally somewhat projecting outside eye and slightly dentate as the whole rim of orbit. Snout slightly prominent, blunt, longer than eye. Mouth opening small, its lips thick, arched, giving the mouth a rounded appearance; teeth rudimenatry; ventral and horizontal border of preoperculum finely serrated. Spinous dorsal nearly twice shorter than soft, spines gradually increasing in size posteriorly, the last about equal to head without snout; soft dorsal regularly rounded. Anal rounded, its three spines rather strong, increasing in size posteriorly, the third the longest, subequal to spine of ventrals, which are about as long as head without snout; their first ray prolonged about equal to length of head, reaching third anal spine. Pectorals acutely rounded, longer than head without snout. Caudal rounded; least height of its peduncle about 8.5 in length. Ground colour whitish or yellowish, a brown tranverse band above ventral fin, split about pectoral in a narrower anterior portion ascending to the two or three anterior dorsal spines and a broad posterior portion reaching to the median dorsal spine; a second similar band extends between soft dorsal and anal enclosing both fins. Ground colour on caudal peduncle crossed by an oval black band, on base of soft dorsal a more or less conspicuous black ocellus with a whitish ring; a black band from occiput to isthmus crossing the eye, at isthmus united whit that of the other side and continued on chest; all bands have a more or less conspicuous white border; a median brown band from tip of snout to above eye. Border of median fins often grayish with two contiguous blackish submarginal lines on soft anal and dorsal which may be continued along base of spinous dorsal; they vanish easily in alcohol changing also other parts of the gaudy pattern. Ventrals blackish, pectorals yellowish or brownish. Middle of scales with a pearly spot, which give on the lower half of the sides of the body the appearance of horizontal, on the upper of oblique lines more conspicuous on the brown transverse bands. Length 150 mm.

Nom. indig. Kepper- of Kiper-Laut (Malay, Batavia).

Habitat. Java, (Batavia)!; Eastern part of Java Sea (4°, 25′ S; 116° 2′ E. 18 M.)!; Flores!; Celebes (Makassar!, Menado, Limbe Strait); Ambon!; Halmaheira; Ceram!; New Guinea. — Philippines; New Pommeren (Bismarck Archipelago).

Note. *Coradion altivelis* described by McCulloch (Biol. Res. Endeavour, IV, 4, 1916, p. 191) from Wide Bay, Queensland, is certainly quite near the present species but seems to differ from it by the rostro-dorsal profile sloping in an almost straight line, by an other form of the preorbital and by the higher and more numerous dorsal and anal rays (D. 33—34, A. 22—23).

2. **Coradion melanopus** (C. V.).

Chaetodon melanopus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1931, p. 84 (insufficient diagnosis).
Chaetodon chrysozonus Günther, Cat. Brit. Mus. II, 1860, p. 34 (p.p.).
Chaetodon melanopus Bleeker, Versl. Akad. Amsterdam XV, 1863, p. 25.
Chaetodon chrysozonus Kner, Fische Novara-Exp. 1865—67, p. 101 (p.p.).
Tetragonopterus melanopus Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 282.
Coradion melanopus Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877, Révis. Chétodont. p. 39. — Atl. ichth. IX, 1877, p. 26, tab. (13) 375, fig. 4.
Coradion melanopus Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 42.
Coradion melanopus Fowler & Bean, Bull. U. S. Nat. Mus. vol. VIII, 1929, p. 51.

D. X, 24—26; A. III, 19; L.l. 44; L.tr. $\frac{10}{19}$.

Strongly compressed, subcircular, dorsal profile more elevated than ventral. Height about 1.3, head 2.9—3 in length; rostro-dorsal profile forming a nearly straight oblique line, slightly concave before eye. Eye 3,2—3,5 in head, about equal to convex interorbital space, the lateral border of which is slightly prominent and thickened above eye and finely dentate as the whole rim of orbit. Snout equal eye, rather blunt; lips less swollen, mouth opening somewhat wider and more oval, teeth more conspicuous than in preceeding species; peroperculum finely serrated. Spinous dorsal about a quarter shorter than soft; its spines rather strong, especially the fourth, fifth, sixth (and seventh) which are subequal, longer than the preceeding and the following three or four which are of equal height, the fifth is about the longest and slightly shorter than head; the scaly sheath covers the anterior half of the spinous dorsal only basally, rising in an oblique line to soft dorsal, the five anterior rays of which follow still the range of the tops of the last spines while the margin of the succeeding part of the dorsal runs vertically towards tail, highest ray equal to head without snout. The anal is of similar from but its anterior margin is more rounded; the three anal spines very strong; the two posterior subequal and longest, longer than head without snout. Pectorals acutely rounded shorter than head; ventrals slightly longer than head, reaching first anal spine, obtuse, the first ray not prolonged, spine somewhat longer than head without snout; caudal slightly convex, least height of its peduncle 8,6 in length. Colour similar to C. chrysozonus, but the ocular band ends abruptly on isthmus, without continuation on chest, the posterior band is narrower and extends between well defined black ocellus with white ring on soft dorsal, between about fourth and tenth ray, and a similar somewhat less defined ocellus between third and sixth anal ray; black ring on caudal penduncle narrower; pectorals more or less yellowish, ventrals blackish. Pearly spots on scales less pronounced. Length 118 mm.

Habitat. Java (Kner?); Ambon!; Ceram (Piru, Wahai, Lokkia!). — Ralum (Bismarck Archipelago). In sea. Seems to be a rare species only known from less than 10 specimens from the quoted localities.

Note. *Chaetodon festivus* Desj. from Mauritius is placed by Bleeker in his Atlas with two? under the synonyma of *Coradion melanopus* as it could possibly belong to this species He adds however „Si cependant le nombre des épines dorsales XII soit exactement rendu il faut bien penser à une différente, qui ne serait pas même un Coradion." Meanwhile he enumerates it in the following year (Verh. Akad. Amsterdam XVIII, (1877) 1878, p. 14) in a list of Fishes from Mauritius under the name „*Coradion melanopus* Blkr.?" without any explication. There is certainly no reason to add it to the synonyma of *C. melanopus*. *Coradion melanopus* is more than a colour variety of *C. chrysozonus*, which differs from it in a dark ocellus on soft dorsal and another on soft anal as Fowler & Bean assume. Both differ in various important morphological characters as our diagnosis shows, which is in conformity with those of Bleeker and Ahl. Kner who united both species, describes two male specimens, which belong evidently to *chrysozonus*.

Their differences from his other specimen, a female, evidently *melanopus,* stroke him and induced him to suppose that the differences between them were of a sexual character. According to this hypothesis *chrysozonus* represents the male, *melanopus* the female sex. We could not make out the validity of this improbable hypothesis, as the intestines of our alcohol specimens were too much damaged.

6. **Parachaetodon** Bleeker.

(Bleeker, Versl. Akad. Amsterdam (2) VIII, 1874, p. 371. Type: *Chaetodon oligacanthus* Blkr. = *Platax ocellatus* C. V.).

Compressed, subrhomboid or nearly circular with prominent snout and elevated back, the dorsal outline angularly heightened by the configuration of the dorsal. Head and body covered with finely ciliated rounded scales of rather small size, longitudinally arranged in horizontal series, on head and median fins conspicuously smaller. Lateral line moderately arched, terminating below posterior part of dorsal. Snout slightly produced, blunt; mouth very small, oblique, the jaws with brushlike bands of small, setaceous teeth, the mandi-

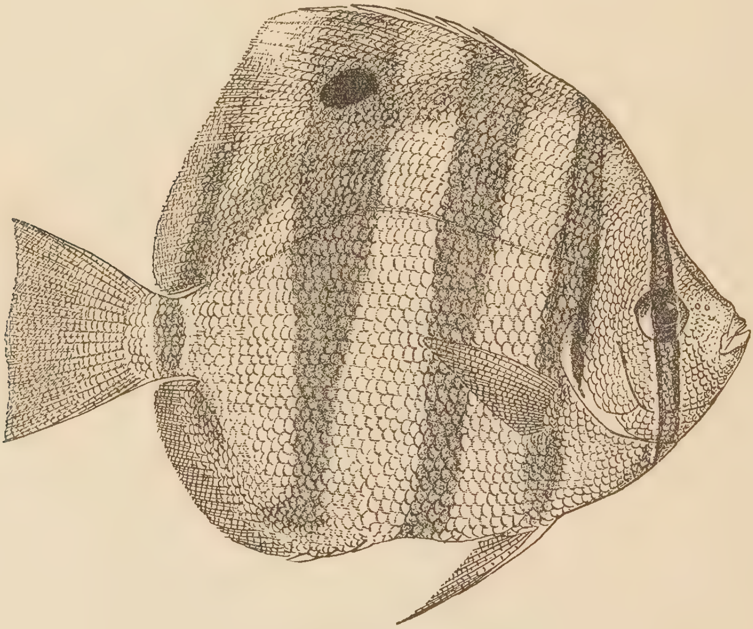

Fig. 11. *Parachaetodon ocellatus* (C. V.).

bulary ones the longest, those on vomer obtuse, in triangular patches. Preoperculum finely denticulate. Dorsal continous with 6 rather weak spines, gradually increasing in height posteriorly, the last much shorter than first ray which is the highest of the 28—29 rays, gradually decreasing in height posteriorly; anal rather low with 3 spines and 19—22 rays, an axillary scaly process present; caudal with 15 divided rays, its middle somewhat convex, both corners slightly emarginate.

Distribution. Marine fishes of moderate size, inhabiting costal water of India, the indo-australian Archipelago, Southern China and „an occasional wanderer into New South Wales waters (Mc Culloch)", the australian species *Chaetodon townleyi* De Vis being doubtful as to its specific independence from *Parachaetodon ocellatus* C. V.

1. **Parachaetodon ocellatus** (C. V.) (Fig. 11).

Platax ocellatus Cuvier & Valenciennes, Hist. Nat. Poiss. VII 1831, p. 229.
Chaetodon oligacanthus Bleeker, Nat. & Geneesk. Arch. Ned. Indië, (3) II, 1845, p. 520. — Verh. Bat. Gen. XXIII, (1849) 1850, Chaetodont. p. 16.
Platax ocellatus Cantor, Catal. Malay. Fish. 1850, p. 170.
Platax ocellatus Bleeker, Nat. Tijdschr. Ned. Indië III (1851) 1852, p. 57. — Versl. Akad. Amsterdam XII, 1861, p. 73. (name only).
Chaetodon oligacanthus Günther, Cat. Brit. Mus. II, 1860, p. 34[1]).
Platax ocellatus Kaup, Ned. Tijdschr. Dierk: I, 1863, p. 129.
Chaetodon oligacanthus Kaup, ibidem.
Sarothrodus oligacanthus Bleeker, l.c. p. 156.
Tetragonoptrus oligacanthus Bleeker, Ned. Tijdschr. Dierk. II, 1865, pp. 148, 189, 286.
Chaetodon oligacanthus Kner, Fische Novara-Exp. 1865—67, p. 102.
Parachaetodon oligacanthus Bleeker, Versl. Akad. Amsterdam (2) VIII, 1874, p. 371.
Parachaetodon ocellatus Bleeker, Arch. Néerl. Sc. Nat. XI, (1875) 1876, p. 304. — Atl. ichth. IX, 1877, p. 24.
Chaetodon oligacanthus Day, Fish. India 4° 1878—1888, p. 109.
Chaetodon oligacanthus Macleay, Proc. Linn. Soc. N. S. Wales II, 1878, p. 351. — Descr. Cat. Austral. Fish. I, 1881, p. 88.
Parachaetodon ocellatus Klunzinger, Sitzb. Akad. Wien 1880, p. 360.
?*Chaetodon townleyi* De Vis, Proc. Linn. Soc. N. S. Wales IX, 1885, p. 454.
Parachaetodon ocellatus Jordan & Seale, Bull. Bur. Fisheries XXVI (1906) 1907, p. 33.

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1) Günther (l. c. p. 489) was the first who recognised the identity of *Platax ocellatus* C. V. with *Chaetodon oligacanthus* Blkr. He was however of opinion (p. 516) that the name given by Bleeker may be preserved, as that of *Chaetodon ocellatus* had been applied to two or three different species. This difficulty is nullified since Bleeker established in 1874 the genus *Parachaetodon* for *Chaetodon ocellatus* = *Platax ocellatus* C. V. = *Chaetodon oligacanthus* Blkr.

Parachaetodon ocellatus Ogilby, Proc. Roy. Soc. Queensland XXI 1908, p. 25.
Parachaetodon ocellatus M. Weber, Fische Siboga-Exp. 1913, p. 309.
Parachaetodon ocellatus Mc Culloch, Biol. Res. „Endeavour" IV, 4, 1916, p. 190. — Check list Fish. N. S. Wales III. Austr. Zoolog. II, pt. III, 1922, p. 92.
Parachaetodon ocellatus Ahl, Arch. Naturgesch. LXXXIX, 1923, p. 18.
Parachaetodon ocellatus Herre & Montalban, Philippine Journ. Sci. 1927, p. 18.
Parachaetodon occellatus Fowler & Bean, Bull. U. S. Nat. Mus. vol. 8. 1929, p. 51.
Parachaetodon ocellatus Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 59.

D. VI, 28—30; A. III, 19—20; Sq. lat. ca 40; L. tr. $\frac{15-16}{20-21}$.

Height more or less than 1.25, head more than thrice in length. Eye 2.5—3 in head, equal to or somewhat less than blunt snout, which goes 3.5—4 times in head. Rostro-dorsal profile with a concavity before and a convexity above eye, strongly ascending to dorsal fin. Ventral profile convex from snout to caudal peduncle. Spinous dorsal about 7 times shorter than length of soft dorsal, the spines rapidly increasing in height posteriorly, the first very small, the last shorter than head and about half length of first ray, the sequant rays evenly graduated to the lowest last. Anal of similar construction, but not elevated, more rounded, with 3 spines, regularly increasing in height posteriorly. Pectorals and ventrals shorter than head; the ventrals angulate, the first ray somewhat produced. Caudal peduncle more or less than 7 times in lenght. Yellowish, a dark blackedged median narrow stripe from front to top of snout; a similar band, narrower than eye, from occiput through eye to anterior part of chest; three somewhat curved broader bands, the first from neck through operculum to base of pectoral and ventral, the second from spinous dorsal to spinous anal, the third widest, from beginning of soft dorsal to soft anal, which may be confluent with an intramarginal band on both soft fins. Caudal peduncle with a transverse band with an anterior and posterior white border. A black oval spot in the dorso-anal band at the base of the anterior half of the soft dorsal; pectorals, ventrals and caudal yellowish, the last with a duskey edge. Young specimens more silvery, the somewhat diffuse bands darker, the oval dorsal spot diffuse, the ventrals blackish. For other characters see those of the genus. Length 140 mm.

Nom. indig. Kepper laut (Malay, Batavia); Kiper (Sundan.).

Habitat: Singapore!; Pinang; Pulu Weh!; Banka; Bintang; Java (Batavia!, Bezuki); Borneo (Balikpapan Bay)!; Celebes (Makassar!, Badjoa); Saleyer!; Buton!; Buru; Ambon!; Ceram!;

Ternate; Halmahera; Waigeu!; Misol, Aru Ild.! — India (Madras), Malay Peninsula, Southern China, Philippines, Queensland, New South Wales. — In sea.

7. **Heniochus** Cuvier.

(Cuvier, Règne anim. II, 1817, p. 335).
Taurichthys Cuvier, Règne anim. édit. II, vol. II, 1829, p. 192.
Diphreutes Cantor, Journ. Asiat. Soc. Bengal. XVIII (1849) 1850, p. 1141.

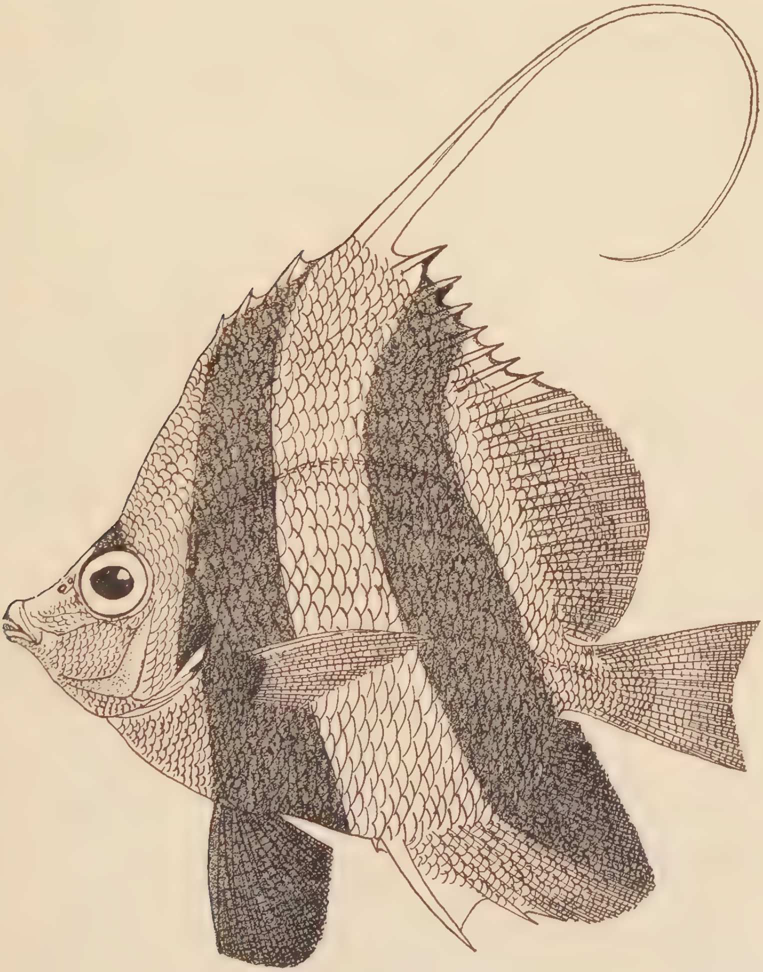

Fig. 12. *Heniochus acuminatus* (L.) × ½ n. s.

Compressed, dorsal outline much elevated, covered with rounded scales of medium size, usually getting smaller on head and towards median fins, which they cover in different extension. Lateral line strongly curved, concurrent which convexity of back, reaching caudal. Head small, snout only slightly prominent, with small mouth opening and nearly equal jaws covered with setiform rather small teeth, none on palatines. Preoperculum more or less denticulate. Eye large, orbit corrugate; in some species with an osseous spinous protuberance growing with age, which may be covered with a horny production, excessively developed in the male of one species. Dorsal with XI—XII spines, all spinous and pungent or the fourth is prolonged into a long filament, in any case the fourth spine is by far the longest; soft dorsal rounded, equal to, longer or shorter than spinous part. Anal with three strong spines and an obtuse or angular rayed part. Pectorals acute. Ventrals ample, rounded, with a strong spine. Caudal truncate, slightly emarginate or convex. A Tholichthys stage, similar to that of Chaetodon, is described by Bleeker in young specimens of Heniochus acuminatus of 35 to 38 mm length.

Distribution. A genus of indo-pacific littoral fishes frequenting coral reefs, of small or medium size, mostly characterized by definite broad dark crossbands on a whitish or yellowish groundcolour, distributed from Mauritius eastwards to Polynesia with a few stragglers northwards to India and Japan. Some of them are valued market fish.

Key to indo-australian species of Heniochus.

A. Nape of neck convex without a median conical osseous prominence.
    1. Spinous dorsal as long as soft. Fourth dorsal spine produced into a filament in adult at least as long as body. Two black transverse, somewhat inclined bands on trunk . . . . 1. *acuminatus* p. 37.
    2. Spinous dorsal longer than soft. Fourth dorsal spine rigid, longer than head, fifth shorter but much longer than remaining spines. Three strongly inclined transverse black bands, the first through head and eye . . . . 2. *permutatus* p. 40.

B. Nape of neck with a conspicuous median conical osseous prominence.
    1. Spinous dorsal longer than soft. Fourth dorsal spine longer than head, its top filamentous. Spine above each eye rather small, wanting in young. Frontpart of head blackish, lips white; trunk with two transverse, sharply defined bands. 3. *monoceros* p. 41.

2. Spinous and soft dorsal about equally long; dark bands on trunk not sharply defined.
   a. All dorsal spines rigid and pungent, fourth and fifth longest but in adult shorter than head. Above each eye in male a strong, broad, curved horn-like spine, small in young and females. Frontpart of head and snout blackish. 4. *varius* p. 42.
   b. Dorsal spines rigid, fourth prolonged, longer than head. Both sexes with rather small bony protuberance above each eye. Lips white, reduced black colour on front part of head and snout crossed by a white transverse band in middle of snout . . . . 5. *singularius* p. 45.

1. **Heniochus acuminatus** (L.). (Fig. 12).

Chaetodon acuminatus Linnaeus, Syst. nat. ed. Xa 1758, p. 272[1]).
Chaetodon macrolepidotus Linnaeus, l. c. p. 274.
Chaetodon acuminatus Bloch, Schneider, Syst. ichth. 1801, p. 229, et p. 232.
Chaetodon macrolepidotus Bloch, Schneider, l. c. p. 231.
Chaetodon acuminatus Lacépède, Hist. nat. Poiss. IV, 1802, pp. 455, 479.
Chaetodon bifasciatus Shaw, Gen. Zool. Pisces IV, 1803, p. 342.
Heniochus macrolepidotus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 93.
Heniochus acuminatus Cuvier & Valenciennes, l. c. p. 98.
Heniochus macrolepidotus Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3) II. 1845 p. 520. — Journ. Ind. Arch. II. 1848, p. 633. — Verh. Batav. Gen. XXIII (1849) 1850, p. 21.
Diphreutes macrolepidotus Cantor, Catal. Malayan Fishes 1850, p. 1141.
Heniochus macrolepidotus Günther, Cat. Brit. Mus. II. 1860, p. 39.
Diphreutes macrolepidotus Bleeker, Nederl. Tijdschr. Dierk. I, 1863, p. 234.
Heniochus macrolepidotus Playfair, Fish. Zanzibar 1866, p. 37.
Heniochus macrolepidotus Klunzinger, Abh. Zool. Botan. Ges. Wien XX, 1870, p. 784.
Heniochus macrolepidotus Günther, Fische Südsee, 1873—76, p. 48.
Heniochus macrolepidotus Peters, Monatsber. Akad. Berlin, 1876, p. 438; l. c. p. 833.
Taurichthys macrolepidotus Bleeker, Poiss. Madagascar, 1875, p. 96. — Verh. Akad. Amsterdam XVII (1876) 1877, p. 47. — Atl. ichth. IX, 1877, p. 29. — Verh. Akad. Amsterdam XVIII (1877) 1878, p. 8.
Heniochus macrolepidotus Day, Fish. India 4°, 1878—1888, p. 110.
Heniochus macrolepidotus Macleay, Descr. Cat. Austral. Fish. I, 1881, p. 94. — Proc. Linn. Soc. N. S. Wales VIII, 1883, p. 263.
Heniochus macrolepidotus Klunzinger, Fische Roth. Meer. 1884, p. 58.

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1) Already Bloch, Schneider and Cuvier & Valenciennes suppose that the statement in the diagnosis of Linnaeus: D $\frac{3}{28}$ was a misprint for $\frac{13}{28}$, as the figure from which it was derived shows clearly 12 or 13 spines.

Heniochus macrolepidotus Steindachner & Döderlein, Denkschr. Akad. Wien XLVIII, 1884, p. 24.
Heniochus macrolepidotus Day, Fish. Brit. India II, 1889, p. 12.
Heniochus macrolepidotus Perugia, Ann. Mus. Civico Genova (2) VII, 1889, p. 272.
Heniochus macrolepidotus Sauvage, Poiss. Madagascar, 1891, p. 515.
?*Heniochus intermedius* Steindachner, Sitzber. Akad. Wien CII, 1893, p. 222.
Heniochus macrolepidotus Picaglia, Atti Soc. Modena (3) XIII, 1894, p. 28.
Heniochus macrolepidotus Jordan & Fowler, Proc. U. S. Nat. Mus. XXV, 1902, p. 542.
Heniochus diphreutes Jordan, Proc. U. S. Nat. Mus. XXVI, 1902, p. 694.
Heniochus acuminatus Jordan & Evermann, Bull. U. S. Fish. Commis. XXIII, (1903) 1905, p. 376.
Heniochus acuminatus Jordan & Seale, Bull. Bur. Fish. XXV, (1905) 1906, p. 346.
Heniochus macrolepidotus Gilchrist & Thompson, Ann. South African Mus. VII, 1908, p. 160.
Heniochus macrolepidotus Pellegrin, Bull. Mus. Hist. Nat. 1912, p. 1.
Heniochus acuminatus M. Weber, Fische Siboga-Exp. 1913, p. 310.
Heniochus diphreutes Jordan, Tanaka & Snyder, Journ. Coll. Sci. Tokyo XXXIII, 1913, p. 212.
Heniochus macrolepidotus Mc Culloch, Biol. Result. „Endeavour” IV, 1916, p. 193.
Heniochus acuminatus Mc Culloch, Check List fish N. S. Wales, Austr. Zoologist II, pt. III, 1922, p. 91.
Heniochus macrolepidotus Ahl, Arch. Naturgesch. LXXXIX, 1923, p. 33.
?*Heniochus intermedius* Ahl, l. c. p. 33.
Heniochus macrolepidotus Barnard, Ann. S. African Mus. XXI, 1925—27, p. 607.
Heniochus acuminatus Herre & Montalban, Philipp. Journ. Sci. XXXIV, 1927, p. 76.
Heniochus acuminatus Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 258. p. 258.
Heniochus acuminatus Fowler & Bean, Bull. U. S. Nat. Mus. vol. VIII, 1929, p. 154.
Heniochus acuminatus Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 61.
Heniochus acuminatus Giltay. Rés. Sc. Voy. Indes Orient. Neérl. Prince Léopold. V, fasc. 3. 1933, p. 69.

D. XI—XII, 24—27; A. III, 16—19; L.r. 44—46; L.tr. $\frac{10—11}{22—24}$.

Greatly compressed and elevated, subrhomboid; height 1.2—1.4, head 2.75 to more than 3 in length. Snout rather short, conical; mouth opening small, horizontal. Rostro-dorsal outline strongly ascending in a somewhat curved line beginning with a concavity to opposite orbit where in adult a tumidity is present which in old age is corrugate or even spiny; from there to dorsal the outline is convex. Eye 3—3.4, its diameter about equal to convex interorbital space. Preoperculum finely serrate. Scales moderate, rounded, getting smaller on head and towards median fins. Lateral line continuous, anteriorly concurrent with back, than obliquely descending and ending at base of caudal. Fourth dorsal spine growing with age, in adult exceedingly elongate, filiform with a rather broad floating membrane; rayed dorsal rounded posteriorly; anal angulate; caudal more or less truncate; pectorals acute, about equal to head; ventrals of about similar length, with a rather strong spine equal to head without snout. Least height of caudal peduncle usually slightly surpassing length of eye. Colour whitish; in alcohol more or less brownish; upper surface of snout and interorbital space black; an anterior broad black band descends from anterior four dorsal spines, touching hind margin of operculum, widening and including base of pectoral, continued along belly on spinous anal and including ventrals; a posterior band from (fifth), sixth and seventh dorsal spine obliquely running downwards and including posterior half of anal; ventrals black, other fins whitish. Length up to 200 mm.

Nom. indig. Gayam, Bandéra (Malay, Batavia).

Habitat: Singapore; Penang; Pulu Weh!; Sumatra (Priaman, N. Atjeh); Nias!; Simalur!; Java (Batavia!, Tjilatjap, Bantam); Duizend Isls.; Borneo (Balikpapan)!; Bali; Postillon Isls.!; Solor; Sumbawa; Timor!; Celebes (Makassar!, Badjoa, Menado); Buton!; Batjan; Ambon!; Buru; Obi major; Ceram!; Banda!; New Guinea!. — Red Sea, Zanzibar, Mozambique, Natal, Bourbon, Mauritius, Madagascar, Seychelles, Muscat, Persian Gulf, India, Ceylon, Andamans, Siam, Philippines, Japan, Riu Kiu Isls., Australia (Port Darwin, Port Essington, N. S. Wales, Queensland), New Hannover, New Britain, New Hebrides, Hawaii Isl., Fidji, Samoa.

Note: It seems still a question, if *Heniochus intermedius* Steindachner (l.s.c.) belongs to the present species, as some authors suppose, or is a proper species. Besides minor differences Steindachner lays stress on the presence of a strongly developed dentate orbital tubercle wanting in specimens of equal size of *H. acuminatus* (L.) and only indicated in larger specimens; he also describes the snout as conspicuously longer, more proboscislike as f.i. in *H. permutatus*. In this regard may be observed that Bleeker says about *H. acuminatus*: „La crête antérieure de l'orbite ne se développe jamais en forme de tubercule ou de corne comme cela se voit dans le varius"; he also remarks that some of his adult specimens have a shorter and more obtuse snout than others, otherwise not differing.

2. **Heniochus permutatus** C.V. (apud Bennet).

Heniochus permutatus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 99. (apud Bennett).
Heniochus chrysostomus Cuvier & Valenciennes ibidem (apud Parkinson).
Heniochus chrysostomus Lay & Bennett, Fishes in Beechey's Voyage 1839, p. 62.
Heniochus melanistion Bleeker, Nat. Tijdschr. Ned. Indië VI, 1854, p. 98.
Heniochus drepanoides Montrouzier, Ann. sc. phys. Soc. d'Agricult. Lyon (2) VIII 1856, p. 444.
Heniochus chrysostomus Bleeker, Nat. Tijdschr. Ned. Indië XV, 1858, p. 200.
Heniochus chrysostoma Günther, Cat. Brit. Mus. II, 1860, p. 41.
Heniochus drepanoides Jouan, Mém. Soc. Sc. Nat. Cherbourg VIII, 1861, p. 258.
Diphreutes chrysostomus Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 234.
Diphreutes chrysostoma Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 189.
Heniochus chrysostomus Günther, Fische Südsee, 1873, p. 49.
Taurichthys chrysostomus Bleeker, Verh. Akad. Amsterdam, XVII, (1876) 1877, p. 45. — Atl. ichth. IX, 1877, p. 29.
Heniochus chrysostomus Macleay, Proc. Linn. Soc. N. S. Wales VIII, 1883, p. 263.
Heniochus chrysostomus Steindachner, Sitzb. Akad. Wien CII, 1893, p. 226.
Heniochus chrysostoma Seale, Occ. Papers, Bishop Mus. I, 1901, p. 102.
Heniochus permutatus Jordan & Snyder, Proc. U. S. Nat. Mus. XXIX, 1906, p. 356.
Heniochus permutatus, Jordan & Seale, Bull. Bur. Fish. XXV (1905) 1906, p. 346.
Heniochus chrysostomus M. Weber, Fische Siboga-Exp. 1913, p. 310.
Heniochus chrysostomus Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 30.
Heniochus permutatus Herre & Montalban, Philippine Journ. of Sci. XXXIV, 1927, p. 80.
Heniochus permutatus Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 258.
Heniochus permutatus Fowler & Bean, Bull. U. S. Nat. Mus. vol. 8, p. 151.
Heniochus permutatus Borodin, Bull. Vanderbilt Marine Mus. I. art. 3, 1932, p. 87.

D. XII, 22—23; A. III, 18—19. L.r. 50—53; L.tr. $\frac{10-11}{22-25}$.

Height 1.3—1.6; head small 2.8—3 in length; rostro-dorsal profile concave before eye, thence ascending nearly vertically to dorsal; before eye a simple or bifid osseous spine, stronger in old age but much shorter than pupil. Eye 2,6—3 in head, equal to or slightly longer than snout and about equal to nearly flat interorbital space. Preoperculum denticulated. Spinous dorsal longer than soft; fourth spine longer than head with a rather broad membrane till top; fifth spine of similar construction but shorter, sixth spine again shorter but longer than third and sequent spines; soft dorsal rounded, less high than strongly rounded soft anal; second and third anal spine about equal and nearly as long as head without snout. Pectorals acute, longer than head; ventrals equal or slightly shorter, rounded. Caudal slightly convex, least height of its peduncle nearly equal to eye. Colour white or yellowish, a broad oblique, somewhat curved black band from neck through posterior part of eye and base of pectoral to belly from base of ventrals to anus; a similar band from fourth and fifth dorsal spine to soft anal including the posterior part of that fin; in young specimens of 50—60 mm. this fin shows a dark ocellus with yellow ring, which disappears with age. A third smaller, more diffuse band on posterior spinous dorsal and along base of soft dorsal is continued on dorsal part of caudal peduncle and as blotch dorsally on base of caudal; pectorals and dorsal rays, the three anterior dorsal spines, anterior part of anal and caudal whitish or yellowish, ventrals black as also interorbital and a median streak on snout. Length 150 mm.

Habitat: Java (Tjilatjap); Flores; Saleyer!; Sula Ils.!; Ambon; Ternate; Banda; Ceram!; Talisse Isl.; Goram; Kisser!; New Guinea. — Madagascar, Madras (Ahl), Philippines; Australia (Queensland), Melanesia, Micronesia, Polynesia. In sea.

3. **Heniochus monoceros** C. V.

Heniochus monoceros Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 100.
Heniochus monoceros Bleeker, Nat. & Geneesk. Arch. N. Indië (3) II, 1845, p. 520. — Verh. Batav. Gen. XXIII, (1849) 1850, p. 21.
?Heniochus macrolepidotus Brevoort, Notes on some fig. of Japanese fish in Narrat. Perry's Exp. to Japan II, 1856, p. 267 (nec L.).
Heniochus monoceros Günther, Cat. Brit. Mus. II, 1860, p. 41. — Fische Südsee 1873—1875, p. 49.
Taurichthys monoceros Bleeker, Enumér. Poissons Madagascar, Leiden 1875, p. 96. — Verh. Akad. Amsterdam XVII (1876) 1877, p. 44. — Atl. ichth. IX, 1877, p. 28. — Verh. Akad. Amsterdam XVIII (1877) 1878, Poiss. Maurice p. 14.
Heniochus monoceros Sauvage, Poiss. Madagascar, 1891, p. 515.
Heniochus monoceros Jordan &Seale, Bull. Bur. Fisheries (1905) 1906, p. 347.
Heniochus monoceros Kendall & Radcliffe, Mem. Mus. Comp. Zool. Harward Coll. XXXV, 1912, p. 143.
Loa excelsa Jordan, Proc. U. S. Nat. Mus. LIX, 1921, p. 652.
Roa excelsa Jordan, Copeia No. 118, 1923, p. 63.
Heniochus monoceros Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 29.
Chaetodon excelsus Ahl, l.c. p. 182.
Heniochus monoceros Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 258.
Heniochus monoceros Fowler & Bean, Bull. U. S. Nat. Mus. vol. 8, 1929, p. 149.

D. XII, 25—26; A. III, 18; L.r. 56—58; L.tr. $\frac{9-10}{24}$.

Height more or less than 2; head about 3 in length, its rostrodorsal profile concave till median protuberance, thence convex till dorsal. Snout prominent, longer than eye, which goes 2.75 to 3 times in head and is somewhat longer than slightly convex interorbital space. Above each eye a rather small osseous protuberance. Spinous dorsal strongly convex, longer than strongly rounded soft dorsal; fourth dorsal spine produced into a long filament about thrice length of body, its broad membrane only in about lower two third developed, sequent spines graduated, lower than dorsal rays. Anal angulate, its spines strong, the second and third subequal, much longer than first. Pectorals acute, about equal to head, ventrals slightly shorter, their spine longer than head without snout. Caudal truncate or slightly emarginate, least height of its peduncle about equal to or somewhat more than eye. Pale brownish or yellowish, a blackish narrow band from origin of dorsal covering front part of head including orbit, chin and muzzle, leaving the lips white; a second transverse band from fifth to seventh dorsal spine, getting broader while descending to belly and reaches from origin of ventral to vent. A similar band, narrower and less defined, descends from the hind part of spinous dorsal to posterior half of soft anal; interorbital space whitish. Remaining parts of dorsal and anal more or less yellowish as also pectorals and caudal, ventrals black. Length up to 226 mm. [Not seen by us].

Habitat: Java (Batavia). — Mauritius, Philippines, Polynesia.

4. **Heniochus varius** (Cuvier). (Fig. 13 and 14).

Taurichthys varius Cuvier, Règne animal édit. 2, vol. II, 1829, p. 128.
Taurichthys varius Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 148.
Taurichthys viridis Cuvier & Valenciennes, l. c. p. 151.
Taurichthys varius Bleeker, Verh. Batav. Gen. XXIII (1849) 1850, p. 25.
Heniochus varius Günther, Cat. Brit. Mus. II, 1860, p. 41.
Heniochus varius Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 270.
Diphreutes varius Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 287.
Diphreutes viridis Bleeker, ibidem.
Heniochus varius Kner, Fische Novara-Exp. 1865/67 p. 103.
Heniochus varius Günther, Brenchley's Cruise of the „Curaçao", 1873, p. 410.
Taurichthys varius Bleeker, Arch. Néerl. Sc. Nat. XI, (1875) 1876, p. 304. — Versl. Akad. Amsterdam (2) X, 1876, p. 313. — Verh. Akad. Amsterdam XVII (1876) 1877, Révis. Chétodont p. 42. — Atl. ichth. IX, 1877, p. 27.
Heniochus varius Macleay, Descr. Cat. Austral. Fish. I, 1881, p. 94. — Proc. Linn. Soc. N. S. Wales VII, 1882, p. 243.

Taurichthys varius Sauvage, Poiss. Madagascar. 1891, p. 515.
Heniochus varius Steindachner, Abh. Senckenberg. Nat. Ges. XXV, 1900, p. 420.
Taurichthys varius Evermann & Seale, Bull. Bur. Fish. XXVI, 1906, p. 97.
Heniochus (Taurichthys) varius Steindachner, Sitzb. Akad. Wien 1906, p. 1391.
Heniochus varius Jordan & Seale, Bur. Fish. XXV, (1905) 1906, p. 347.
Heniochus varius Ahl, Arch. Naturgesch. LXXXIX, 1923, p. 24.
Heniochus pleurotaenia Ahl, l. c. p. 26.
Heniochus varius Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 79.
Heniochus varius Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 257.
Heniochus varius Duncker & Mohr, Zool. Mus. Hamburg, XLIV, 1929, p. 23.
Heniochus varius Fowler & Bean, Bull. U. S. Nat. Mus. 8, 1929, p. 147.
Heniochus varius Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 61.
Heniochus varius Giltay, Rés. Sc. Voyage Indes Orient. Néerl. Prince Léopold. V, fasc. 3. 1933, p. 69.

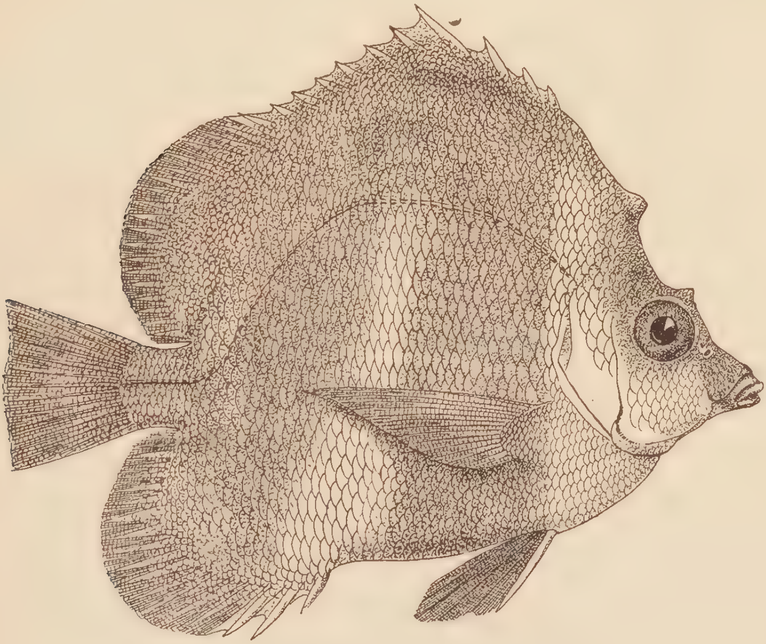

Fig. 13. *Heniochus varius* (Cuv.) ♀. × 3/5.

D. XI, 22—25; A. III, 17—18; L.r. 52—55; L.tr. $\frac{10}{22-24}$

Compressed, strongly elevate, ventral profile slightly rounded; height 1.25—1.30, head small 2.75—3.3 in length. Eye 2.75—3.2 in head, about equal to interorbital space. Snout conical, concave above, somewhat less or more than diameter of eye. Vertical and horizontal limb of preoperculum finely serrated. Orbit with the outer margin somewhat prominent in adult and serrated; above each orbit in females a small rigth horny spine, which in males grows out to a stout, broad, outwardly curved, sharp horn. About in middle of concave outline between orbit and origin of dorsal a single median, scaly osseous protuberance, small in young, growing stouter with age and reaching in males nearly the diameter of eye. Spinous and rayed dorsal of about equal length; fourth spine the longest and strongest, without a flexible or filamentous part, in adult more than thrice in lenght, with a broad, somewhat produced membrane. Soft dorsal rounded, higher than spinous dorsal, but lower than strongly rounded anal. Anal spines strong, the second and third usually about equal and much longer than first. Pectorals acute, longer than head, about equal to ventrals, which have a strong spine, about as long as head without snout. Caudal truncate, least heigth of caudal peduncle somewhat longer than diameter of eye. The colour pattern shows some marked variability, which induced to create two species, which however miss morphological differences of any importance or constancy and have therefore only the value of coulour varieties. The primordial pattern as described by Cuvier & Valenciennes and repeated in the figure of Bleeker and with slight variation in the descriptions of later authors, is about as follows: Generally blackish brown, paler on flanks; a pearlcoloured, partly yellowish, somewhat diffuse band descends from anterior dorsal spines behind eye, getting broader towards chest. A similar, usually sharply defined band runs from middle of spinous dorsal along base of soft dorsal towards caudal peduncle, encircling it; ventrals, part of spinous dorsal and anal more or less blackish brown; caudal and soft dorsal paler, pectorals yellowish brown. Of a striking variety, first described by *Kner*

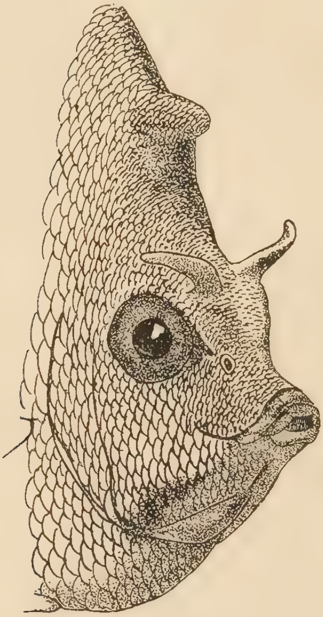

Fig. 14. *Heniochus varius* (Cuv.) head of male, nat. size. One quarter front-view.

(l. s. c.) but raised by *Ahl* (l. s. c.) to the rank of a species, called *H. pleurotaenia,* notwithstanding he himself is not able to state any morphological differences of importance, we have at our disposal a male and female specimen, collected on the fishmarket at Batavia. It is characterized by a pearly grondcolour, by a black snout, which colour is continued as a shadow behind eye till beginning of back; on spinous dorsal and below it a blackish patch from which descends an anterior band and occupies the abdomen from base of ventrals to anus; a posterior oblique band running to soft anal, including also the spinous anal; between both bands a more or less triangular patch of the groundcolour; base of soft dorsal blackish, ventrals black, pectorals and caudal paler. This colour variety is connected with *H. varius* by transitional colour patterns. Length up to 190 mm.

Nom indig.: Karbo (Malay, Batavia).

Habitat. Batu Isl.; Sumatra (Padang); Java (Batavia)!; Celebes (Makassar, Menado, Limbe Strait, Binang Unang); Talisse Isl.; Ternate; Tidore; Halmahera; Ceram (Wahai!); Ambon!; Banda!; Timor!; Misol; New Guinea (Astrolabe Bay!). — Madagascar, Philippines, Australia (Queensland); New Pommern, Bismark Arch., Polynesia.

5. **Heniochus singularius** Smith & Radcliffe. (Fig. 15).

Heniochus singularius Smith & Radcliffe, Proc. U. S. Nat. Mus. XL, 1911, p. 321.
Heniochus singularius Ahl, Arch. Naturgesch. LXXXIX, 1923, p. 28.
Heniochus singularius Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 77.
Heniochus singularius Fowler & Bean, Bull. U. S. Nat. Mus. 8, 1929. p. 152.
Heniochus singularius Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 61.

D. XII, 25—26; A. III, 17—18; L.r. ca. 50—52; L.tr. 11—12 (between L.l. and D.), 24—26 between L.l. and A.

Compressed, trapeziform, similar to *H. varius*; head 3—3.5 in length, small; snout in adult blunt with swollen lips, conical, rostro-dorsal contour obliquely ascending in a nearly straight line till median osseous nuchal tubercle of not more than half diameter of eye; interorbital space swollen with a horizontal, outwards directed, rather small osseous spine above each eye; profile above median tubercle till dorsal strongly rounded. Eye 3.4—4, about equal to interorbital space. Fourth dorsal spine longer than head, about 2.2 in length. Otherwise similar to *Heniochus varius.* Colour in old specimens a narrow whitish band from interorbital, widening while descending downward to chin, frontpart of snout before it black, top of lips white; parallel with first descends a similar pale band from top of head, touching hind border of eye and strongly broadening reaches chest; between first and second pale band a black ocular band; from anterior spinous dorsal descends a blackish band, much broadening to ventral and ventrally continued to base of spinous anal; from spinous dorsal descends an anteriorly ill defined oblique black band to peduncle of caudal including anal, it may be connected in a shadowy form with the thoracal black band and gives the sides of the body a nearly black hue; posterior

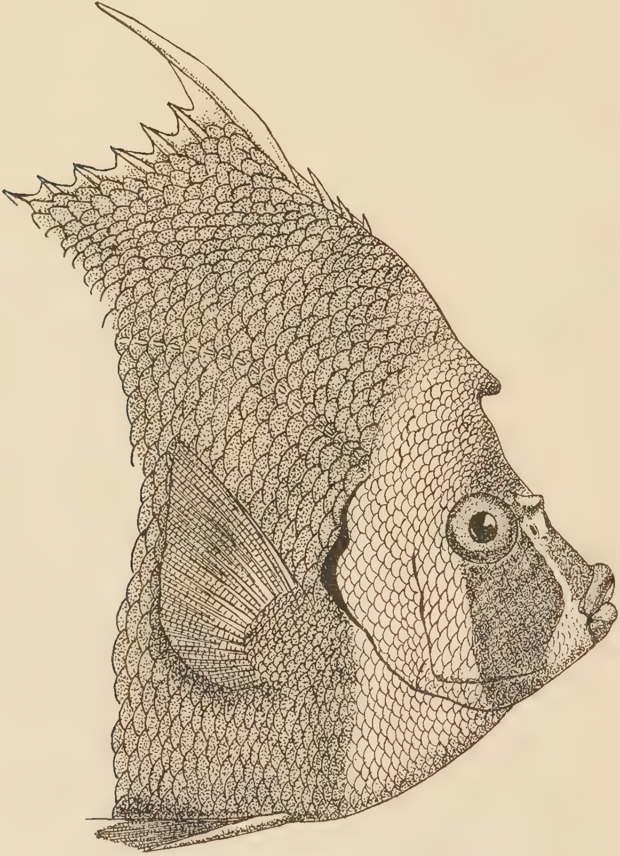

Fig. 15. Anterior part of *Heniochus singularius* Smith & Radcliffe from Batavia, about $^2/_3$ n. s.

half of spinous and soft dorsal, caudal and rayed part of anal pearl coloured. Length up to 245 mm.

Habitat: Java (Batavia!); Si Amil Isl.; Eastern Borneo; Celebes (Gulf of Tomini); Halmahera. — Philippines, Formosa; in sea.

Note: We are also of the opinion of Herre & Montelban, that *H. singularius* is closely allied to *H. varius* C. V. At first we even shared their opinion that „a large series in all the growth stages might show their identity". But there is, besides the difference in colour, principally expressed in the colour pattern of the head, and besides small morphological differences, an important fact which speaks against it. *H. singularius* is in possession of only a short, bony spine above each eye, shorter than pupil, similar to that of the female of *H. varius,* but it misses the strong, curved, horn-like spine, which shows the male of that species already at about a length of 150 mm. We conclude this from the fact, that at least 18 specimens of *singularius* from 152—245 mm. length are described, all without the horn characteristic for the male of *H. varius.* It seems unlikely, that only females are caught at Java 1), Borneo, Celebes, Formosa and the Philippines.

8. **Gonochaetodon** Bleeker.

(Bleeker, Arch. Néerland. sc. nat. II, 1876, p. 306).

Strongly compressed, rhomboid; scales minute to small on head and on sheath of median fins, on trunk of moderate size, irregular, mostly rhomboid, arranged in superior and inferior oblique transverse series, meeting in middle of height in obtuse angels directed towards head; lateral line arched, terminating at a distance of about six scales before end of dorsal. Snout short, prominent, conical; mouth small, oblique; teeth setiform, conspicuous, the mandibulary ones the longest. Dorsal with XII spines, slightly increasing in height posteriorly; anal with III spines; soft anal and dorsal elevated, hindborder of both vertical, dorsal somewhat angulate, anal less so, more rounded.

Distribution: Small marine fishes living in costal water of the indo-australian Archipelago, the Red Sea, Australia and some islands of Melanesia and Polynesia.

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1) Our specimen from Batavia of 245 mm. length is eviscerated, we are therefore unable to determine its sex.

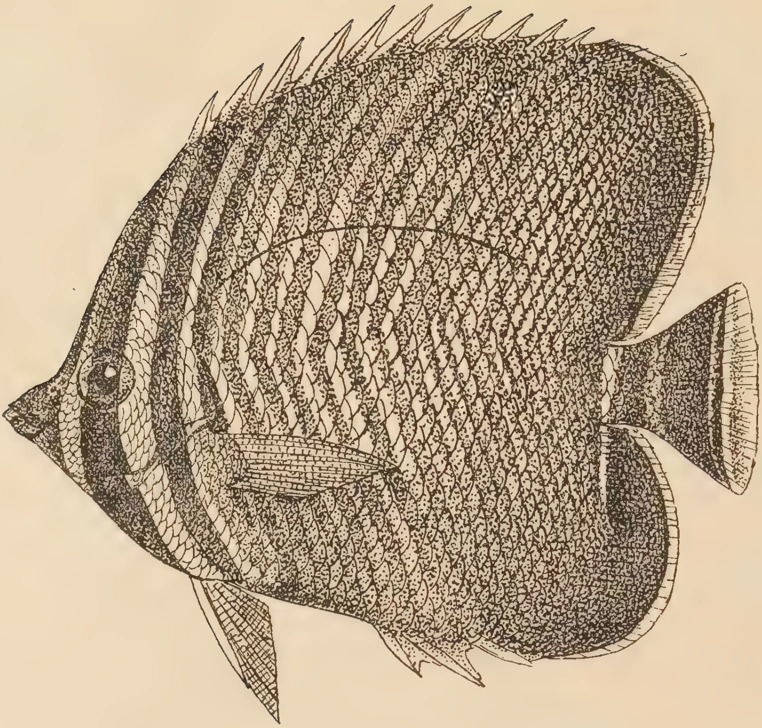

Fig. 16. *Gonochaetodon triangulum* (C. V.) n. s.

1. **Gonochaetodon triangulum** (C. V.). (Fig. 16).

Chaetodon triangulum Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 44, (ex Kuhl & van Hasselt).
Chaetodon baronessa Cuvier & Valenciennes. loc. cit. p. 45.
Chaetodon baronessa Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 239.
Chaetodon baronessa Günther, Cat. Brit. Mus. II, 1860, p. 31.
Citharoedus triangulum Kaup, Arch. Naturgesch. XXVI, 1860, p. 143.
Sarothrodus baronessa Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 155.
Tetragonoptrus baronessa Bleeker, l. c. p. 234.
Tetragonoptrus (Gonochaetodon) triangulum Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877, Chétodontoides, p. 107, — Atl. ichth. IX, 1877, p. 53.
Chaetodon baronessa Macleay, Proc. Linn. Soc. N. S. Wales VII, 1882, p. 243.
Chaetodon triangulum Meyer, An. Soc. Española Hist. Nat. XIV, 1885, p. 16.
Chaetodon baronessa Meyer, l.c. pp. 16, 17.
Chaetodon triangulum Alcock, Journ. Asiat. Soc. Bengal LXV, 1896, p. 312.
Chaetodon triangulum Steindachner, Abh. Senckenberg. Natf. Ges. XXV, 1900, p. 420.
Gonochaetodon triangulum Jordan & Seale, Bull. Bur. Fish. (1905) 1906, p. 337.
Chaetodon triangulum M. Weber, Fische Siboga-Exp. 1913, p. 308.

Chaetodon triangulum Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 174.
Chaetodon triangulum subsp. baronessa Ahl, loc. cit. p. 175.
Gonochaetodon triangulum Mc Culloch, Rec. Austral. Mus. XV, 1926, p. 36.
Chaetodon (Gonochaetodon) triangulum Herre & Montalban, Philippine Journ. Sci. XXIV, 1927, p. 26.
Chaetodon baronessa Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 257.
Chaetodon triangulum Fowler & Bean, U. S. Nat. Mus. 8, 1929, p. 136.
Gonochaetodon triangulum Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 60.

D. XI, 26—28; A. III, 21—23; L.l. 17—19; L.r. 30—32; L.tr. $\frac{7-8}{15-19}$.
Height 1.25—1.4; head 3—3.5 in length; head slightly shorter than high, rostro-dorsal profile steeply ascending with a concavity before eye. Eye 2.7 to more than 3, equal to or slightly longer than snout and somewhat greater than convex interorbital space; preoperculum indistinctly denticulate. Spinous dorsal slightly longer than soft; last spine subsequal to head without snout; about sixth, seventh and eighth ray forming a rounded angel on border of fin, the highest equal to head or even longer. Last anal spine longest, nearly equal to last dorsal spine, soft anal somewhat less elevated, rounded. Pectorals pointed, nearly equal to head; ventrals acute, the first prolonged ray nearly reaching anal, its spine about equal to head without snout. Caudal truncate or slightly convex, least height of its strongly compressed peduncle equal to eye. For other characters see diagnosis of genus. Dark brown, paler on head and chest, an ocular band curves from the two anterior dorsal spines to base of ventral, before it a frontal stripe comprising snout, behind it a third narrow band from spinous dorsal across operculum to belly. Sides of body with alternating, angularly bent dark brown and whitish bands, more diffuse on posterior part of body; soft dorsal and anal dark brown, outwards reddish, as also caudal peduncle, their margin lighter with a submarginal dark line, caudal blackish encircled by yellow; pectorals and ventrals whitish. In two colour varieties from the Red Sea: only the ocular band is present in *G. triangulum* var. *karraf* C. V., while otherwise the greater part of head and chest is brownish red; in var. *larvatus* Ehrenberg only the last named colour is present and even the ocular band is wanting. Length 120 mm.

Nom. indig. Kiper (Malay. Batavia).

Distribution: Singapore!; Pulu Weh!; Sumatra (Padang!, Priaman, Sipora!); Batu Isl.; Nias; Java!; Serbete Isl. (Strait Flores)!; Solor!; Lamakera!; Timor!; Celebes (Menado);

Ternate!; Tidore; Obi major; Banda!; Halmahera; Buru; Ambon!; Ceram!; Mysore; New Guinea. (Geelvink Bay!, Astrolabe Bay!) — Andamans, Philippines, Queensland, Palawan, Ralum, New Pommern, Bougainville, Solomon Isls., New Hebrides, New Caledonia.

9. **Megaprotodon** Guichenot.

(Guichenot, Revue Zool. XI, 1848, p. 12; Bleeker, Arch. Néerl. Sc. nat. XI, 1876, p. 306).

Compressed, elongate oval. Scales small to minute on head, chest and sheath of median fins, those on trunk large, rhomboid or rounded, the upper series obliquely directed upwards, the lower obliquely downwards, both meeting in an acute angle, more pronounced by corresponding angulate cross stripes; lateral line slightly arched, ending before termination of soft dorsal. Teeth uncinate, bristel-like, much more developed in anterior part of jaws, laterally wanting or only minute ones on sides of mandible, none on vomer. Snout short, obtuse, preorbital and preoperculum slightly denticulate; orbit corrugate. Spinous dorsal at least twice longer than soft dorsal, its XIV spines evenly graduated to the last; soft dorsal with the middle rays prolonged, its posterior border concave. Anal with four spines and an angulate rayed part and a slightly concave hind-border. Other characters as those of Chaetodon.

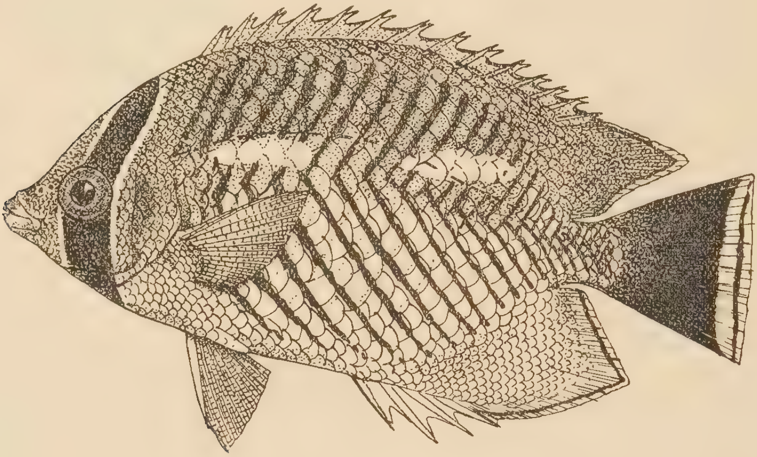

Fig. 17. *Megaprotodon strigangulus* (Gm.) × 4/5.

Distribution. Small fishes inhabiting the costal water from the Red Sea, Zanzibar, Mauritius to the islands of Polynesia.

1. **Megaprotodon strigangulus** (Gm.) (Fig. 17).

Chaetodon strigangulus Gmelin, Syst. Nat. ed. 13, 1788, p. 1269, (apud Solander).
Chaetodon trifascialis Quoy & Gaimard, Voy. Uranie & Physicienne 1824, Zool. p. 379.
Chaetodon triangularis Rüppell, Atlas Reise N. Afrika, Fische 1828, p. 42.
Chaetodon strigangulus Cuvier & Valenciennes, Hist. Nat. Poiss. VII, 1831, p. 42.
Chaetodon bifascialis Cuvier & Valenciennes, l. c. p. 48.
Chaetodon leachii Cuvier & Valenciennes, l. c. p. 49.
Chaetodon strigangulus Lay & Bennett, Beechey's Voy. 1839, p. 60.
Megaprotodon bifascialis Guichenot, Revue Zool. 1848, p. 12.
Chaetodon strigangulus Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 239.
Chaetodon strigangulus Rüppell, Samml. Senckenb. Mus. 1852, p. 9.
Chaetodon trifascialis Bleeker, Nat. Tijdschr. Ned. Indië, VII, 1855, p. 313.
Chaetodon triangularis Montrouzier, Ann. Sc. phys. Soc. d'Agriculture Lyon (2) VIII, 1856, p. 444.
Chaetodon strigangulus Günther, Cat. Brit. Mus. II, 1860, p. 4.
Chaetodon trifasciatus Günther, loc. cit. p. 5.
Eteira triangularis Kaup, Arch. f. Naturgesch. XXVI, 1860, p. 147.
Sarothrodus strigangulus Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 156.
Tetragonopterus strigangulus Bleeker, loc. cit. p. 242.
Chaetodon striangulus Playfair, Fish. of Zanzibar, 1866, p. 32.
Chaetodon striangulus Klunzinger, Verh. Zool. bot. Ges. Wien XX, 1870, p. 775.
Chaetodon strigangulus Günther, Fische Südsee, 1873—75, p. 35.
Chaetodon strigangulus Peters, Monatsber. Akad. Berlin, 1876, p. 437.
Megaprotodon strigangulus Bleeker, Syst. Percarum, Arch. Néerl. Sc. Nat. XI, 1876, p. 307. — Verh. Akad. Amsterdam XVII (1876) 1877, Chétodont. p. 119. — Atl. ichth. IX, 1877, p. 54. — Arch. Néerl. Sc. Nat. XIII, 1878, p. 45.
Chaetodon strigangulus Macleay, Proc. Linn. Soc. N. S. Wales VII, 1882, p. 241.
Chaetodon (Megaprotodon) strigangulus Klunzinger, Fische Roth. Meer, 1884, p. 58.
Chaetodon strigangulus Sauvage, Poiss. Madagascar, 1891, p. 575.
Megaprotodon bifascialis Jordan & Seale, Bull. Bur. Fish. XXV, (1905) 1906, p. 336.
Chaetodon strigangulus M. Weber, Siboga-Exp. Fische, 1913, p. 308.
Chaetodon strigangulus Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 179.
Chaetodon (Megaprotodon) strigangulus Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 24.
Megaprotodon striangulus Fowler, Bishop Mus. X, 1928, p. 256.
Chaetodon trifascialis, Fowler & Bean, Bull. U. S. Mus. vol. 8, 1929, p. 139.
Chaetodon strigangulus Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 60.

D. XIV, 15—17; A. IV (by exception V); 15—16; L. r: 23—25; L.tr. $\frac{8-9}{12-14}$.

Height 2.4—2.6, head 3—3.5 in length. Eye somewhat more or less than 3 in head, equal to or little less than convex interorbital space and equal to or slightly longer than snout, which has the lips somewhat swollen. Last dorsal spine the longest, about half length of head. First anal spine short the following three subequal the third the longest. Pectorals acutely rounded, smaller than head; ventrals acute, the first ray prolonged nearly reaching vent, their spine equal to head without snout. Caudal truncate, least height of its peduncle greater than eye. For other characters see those of the genus. Ground colour pale brown above, whitish below, a blackish band, slightly narrower than eye, from neck through eye over interoperculum to chest where it is united with that of the other side, its front- and hindborder whitish; trunk crossed by about twenty blackish or paler narrow angulate stripes, corresponding to the transverse series of scales; the angles bent toward head and situated in a line running from eye to middle of caudal; below lateral line two elongate oval pale patches; soft dorsal and anal with a violet intramarginal line; base of caudal black, with a broad yellowish border and an intramarginal dark line. Length 140 mm.

Habitat: Batu Isl.; Pulu Weh (Sabang Bay!); Celebes (Menado); Karkaralong Isls.!; Karakelang Isls.!; Halmahera; Obi major; Ambon!; Ceram; Banda; Flores (Isl. Palowé)!; Timor!; New Guinea (Astrolabe Bay!). — Red Sea, Zanzibar, Mauritius, Philippines, Marianas, Jaluit, Ellice Isl., Paumotu Arch., Society Isls., Samoa, Guam.

10. **Chaetodon** Linnaeus (p.p.).

(*Linnaeus,* Syst. Nat. ed. Xa, 1758, p. 272).

Compressed, oval, orbicular or subrhomboid, covered by regularly rounded, ciliated scales of small or moderate size, smaller on head and median fins, in upper half of trunk arranged in horizontal, longitudinal series, in lower half likewise unless they are posteriorly more or less upwards inclined. Lateral line arched or angulate, not reaching caudal. Linea recta 50 or less. Snout blunt, equal to or shorter or slightly longer than eye or conical pointed and longer than eye. Mouth small, with setiform teeth in brush-like bands in jaws. Preoperculum usually slightly denticulate. Spinous dorsal equal to, usually much to twice longer than soft dorsal; dorsal spines (XI) XII—XIII (XIV), none prolonged, usually graduated till middle ones; dorsal rays 17—27 forming a rounded, rarely angulate fin, by exception some of the rays are setiform prolonged. Anal with III, by exception IV—V strong spines and 15—24 rays.

Distribution: Marine littoral fishes of small or moderate size, inhabiting tropical and subtropical seas, frequenting rocky coasts, mostly living on and near coral reefs; especially numerous in the Indo-Pacific region. Generally of not much market value.

Key to the indo-australian subgenera and species of *Chaetodon.*

I. Anal with four to five spines.

1. Oblong-oval not strongly compressed; rostro-dorsal profile ascending in a nearly straight line, slightly concave before eyes. Scales rounded, medium, arranged in horizontal series. Lateral line moderately arched. Snout blunt, equal to or shorter than eye. Mouth small; setiform teeth rather long also on side of jaws. Commencement of gape of mouth level with lower border of eye. Preoperculum entire. D. XIII—XIV, 17—19; A. IV—V, 15—17; L. r. 43—45.

1. Subgenus **Tetrachaetodon** novum.

1. Species unica . . . . 1. *plebeius* p.56.

II. Anal with three spines.

1. Oval; regularly rounded scales, on trunk horizontally arranged or inferiorly slightly upwards inclined. Commencement of gape of mouth level with or above lower border of eye. Lateral line more or less arched or strongly ascending. Spinous dorsal nearly twice longer than soft dorsal. Dorsal (XII) XIII—XIV, 17—20 to 25—27; A. III, 15—16 to 23—24; Linea recta 30—50.

2. Subgenus **Rhabdophorus** Swainson.

A. Some of the anterior dorsal rays prolonged. Rostro-dorsal profile deeply concave before eye, thence ascending convexly. Snout conical pointed, much longer than eye. Lateral line strongly arched. D. XIII—XIV, 24—27.
  a. Fourth and fifth dorsal ray prolonged. A faint ocular streak from front to below eye. . . . . 1. *ephippium* p. 59.
  b. Second and third dorsal ray prolonged; broad ocular band from nape widening to isthmus . . . . 2. *semeion* p. 61.
B. No prolonged dorsal rays; rostro-dorsal profile obliquely ascending, at most with a slight indication of concavity. Snout bluntly rounded, scarcely longer or shorter than eye. D. XIII—XIV, 15—20.
  a. L. r. 45—46; L. l. slightly arched. Ocular

band from nape to isthmus, a white-edged large ocellus below ultimate dorsal spines crossed by L. l.; two curved bands from operculum to caudal . . . . 3. *bennetti* p. 62.

b. L. r. 40—42; L. l. strongly arched, last sensory scales abruptly descending to axil of dorsal. Ocular band from nape widening to chest, a large oval black patch below posterior half of spinous dorsal, superiorly crossed by L. l. . . . . 4. *speculum* p. 64.

c. L. r. ca. 38. L. l. curved toward anterior third of soft dorsal, reappearing on caudal peduncle. Ocular band from nape to chest separated by white from dusky snout and from dark stripe along preopercular border, similar bands on soft dorsal and anal; body with curved bands. . . . . . 5. *trifasciatus* p. 66.

2. Oval, regularly rounded scales on trunk, the longitudinal and transverse series somewhat irregularly arranged, the lower only slightly ascending. Commencement of gape of mouth conspicuously below lower border of eye. Rostro-dorsal profile obliquely ascending. Lateral line angularly deflected below last dorsal spine. Snout short obtuse, equal eye or slightly longer. Spinous dorsal somewhat longer than soft. D. XII, 23—26. A. III, 19—22. L. r. 50—55.

3. Subgenus **Citharoedus** (Kaup) Blkr.

a. About five transverse bands on head, the second, the ocular, from front to breast, three postocular ones on operculum; body with six to seven oblique longitudinal bands. . . . . 1. *ornatissimus* p. 71.

b. Three transverse bands on head, the second, the ocular, from front to breast, the postocular one curved from dorsal to anal, crossing operculum; complicated curved ones on body . . . . 2. *meyeri* p. 69.

3. Orbicular to subrhombic; regularly rounded scales arranged in longitudinal horizontal series, inferiorly in somewhat upwards oblique direction. Lower border of eye above horizontal through commencement of gape of mouth. Rostro-dorsal profile steeply ascending in a straight line with a slight indication of concavity near snout. Lateral line arched. Snout more or less pointed, equal eye or sligthly longer. Spinous dorsal less than 1½ times longer than soft. D. XIII—XIV; A. III, 16—20; L.r. 32—46.

4. Subgenus **Tetragonoptrus** (Klein) Blkr. emend.

A. Body with transverse bands, snout more obtuse, equal eye.
  a. Eight bands separated by wide interspaces: first ocular from nape to chest, second and third curved before and behind P., following three from D. to A. the last through soft D. A. and caudal peduncle . . . . 1. *octofasciatus* p. 72.
  b. Trunk with about seven somewhat diffuse incomplete broad bands, inferiorly spotted; short ocular band, above it median horseshoe-shaped patch. . . . 2. *punctato-fasciatus* p. 75.
B. All trunk-scales or part of them centrally dotted; snout more pointed, slightly longer than eye. Ocular band from nape to isthmus.
  a. Centre of scales on trunk and tail with a bluish spot, forming somewhat irregular obliquely ascending lines.
    α. Anal angulate, its straight anterior part with a black edge and yellow submarginal band, both getting broader anteriorly . . . . 3. *citrinellus* p. 77.
    β. Anal rounded with rather broad white edge and submarginal black line, both continued along the whole fin . . . . 4. *güntheri* p. 79.
  b. Dark dots on centre of scales forming only anteriorly on trunk ten to eleven vertical series . . . . 5. *miliaris* p. 80.

4. Oval to rhombic, scales regularly rounded, their longitudinal series in superior half of trunk horizontal, in inferior half strongly hind- and upwards ascending even till soft dorsal. Snout more or less conical equal to or longer than eye. Spinous dorsal equal to or longer than soft. D. XII, 19—20 to XII, 25—27; A. III, 17—18 to III, 20—22; L. r. 24—40.

5. Subgenus **Chaetodontops** Blkr.

A. Lower border of eye below horizontal through commencement of gape of mouth. Rostro-dorsal profile concave. Lateral line arched. Snout longer than eye. D. XII, 23—25; soft D. and A. angular. L.r. 38—40 1. *lunula* p. 7.
B. Lower border of eye touching or somewhat above horizontal through commencement of gape of mouth. Lateral line angular. Rostro-dorsal profile steeply ascending. Soft D. and A. rounded.

a. Spinous dorsal longer than soft.
  α. L. r. 35—40. D. XII, 19—20. Ocular band from nape, meeting its fellow on chest, forming a blotch; dorsal part of body uniform dark brown, eventually with about two light patches; longitudinal ascending rows of scales with series of dots or dark lines. . . . . 2. *melanotus* p. 87.
  β. L.r. 28—32. D. XII, 20—22. Ocular band from nape fading below eye to suboperculum; a broad crescentic band along base of D. and A . . 3. *selene* p. 90.
b. Spinous dorsal about equal to soft; greenish or brown oblique stripes on trunk following ascending series of scales. L. r. 30—35; D. XII, 23—27.
  α. Broad ocular band from nape to chest with broad white borders, a black preocular bar. . . . . . . 4. *collare* p. 91.
  β. Ocular band separated from or narrowly united with its fellow above eye, terminating at suboperculum, behind it a small, usually angulate broad patch on nape continued as narrow stripe behind operculum. . 5. *bella-maris* p. 93.

1. Subgenus **Tetrachaetodon** novum

[Type: *Chaetodon plebeius* C. V. after Broussonet]. cfr. page 53.

Oblong oval, rostro-dorsal profile ascending in a nearly straight line, slightly concave before eye. Scales regularly rounded, on trunk of medium size, longitudinal series horizontally arranged, somewhat arched above and below. Lateral line moderately arched not reaching caudal. Preoperculum entire. Lower border of eye in horizontal through commencement of gape of mouth, which is small, horizontal, the jaws equal with setiform teeth. D. XIII—XIV, 17—19; A. IV—V, 15—17. Soft dorsal rounded, soft anal gently angulate; caudal truncate. L.r. 43—45.

1. **Chaetodon (Tetrachaetodon) plebeius** C.V. (Fig. 18).

Chaetodon plebeius Cuvier & Valenciennes, Hist. Nat. Poiss. VII, 1831, p. 68 (after Broussonet).
Chaetodon plebejus Günther, Cat. Brit. Mus. II, 1860, p. 5.
Chaetodon plebejus Day, Proc. Zool. London 1870, p. 687.
Chaetodon plebejus Günther, Fische Südsee 1873—1875, p. 35.
Chaetodon plebejus Day, Fishes India 4° 1878—1888, p. 104.

Chaetodon plebejus Macleay, Descr. Catal. Austral. Fish I, 1881, p. 90. — Proc. Linn. Soc. N. S. Wales VIII, 1883, p. 262.
Chaetodon plebejus Steindachner, Sitzb. Akad. Wien CII, 1893, p. 227.
Chaetodon plebejus Jordan & Seale, Bull. Bur. Fish. XXV, (1905) 1906, p. 345.
Megaprotodon maculiceps Ogilby, Proc. Roy Soc. Queensland XXIII, 1910, p. 14.
Chaetodon plebejus Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 54.
Chaetodon plebeius Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 28.
Megaprotodon plebeius Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 256.
Chaetodon plebeius Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 78.
Megaprotodon plebeius Whitley, Great Barrier Reef Exped. IV, No. 9, 1932, p. 288.

D. XIII—XIV, 17—19; A. IV—V, 15—17; L. r. 43—45; L.tr. $\frac{6-7}{13-14}$.

Oblong oval, not strongly compressed, rostro-dorsal profile moderately ascending in a nearly straight line, slightly concave before eye.

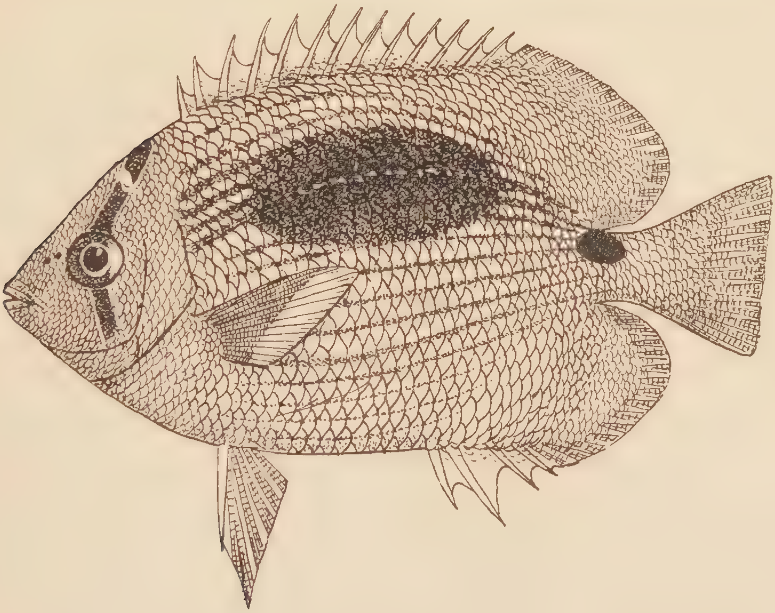

Fig. 18. *Chaetodon (Tetrachaetodon) plebeius* C. V. After Herre & Montalban.

Height 1.6—1.8, head 3—3.3 in length. Eye about 3 in head, somewhat less than convex interorbital space, nearly equal to blunt snout. Lower border of eye in horizontal through commencement of gape of mouth which is small; teeth rather long, also on sides of jaws present. Angel of preoperculum rounded, smooth. Scales of medium size, getting smaller posteriorly and very small on head and median fins, arranged in horizontal series, in arched series on uppert part of trunk. Lateral line moderately arched. Spinous dorsal much longer than soft; fifth and sixth spine highest, about 1.3—1.6 in head, soft dorsal rounded, anal gently angulate, its second spine the longest, about as long as sixth dorsal spine. Pectorals and ventrals nearly equal, about 1.2 in head. Caudal truncate, least height of its peduncle 2.9 in head. General colour uniform yellow, with more or less conspicuous narrow dark lines along the longitudinal series of scales, some of them broader in upper half of trunk where their middle part is united into a longitudinal oval dark patch, longer than head, extending over about 5 series of scales, three above two below lateral line; on upper border of base of caudal peduncle a black oval spot; a blackish ocular band, narrower than eye, reaching from superior border of interoperculum to nape, before origin of dorsal. Length 116 mm. (Not seen by us).

Habitat: New Guinea. — Andamans, Formosa, Philippines, Sue Isl. Torres Strait, Queensland, Fidji.

Note: Herre & Montalban have already directed attention to the fact, that Broussonet's type in the British Museum described by Cuvier & Valenciennes and later by Günther (1860 & 1873) and Day (1878) did not show the elongate blotch on sides, found by later authors who could dispose of fresh specimens. Günther who described it when the type-specimen was nearly hundred years old, called it „rather bleached". The painting in his Südseefische is not made by Garrett as Herre & Montalban believe, but by Ford after Broussonet's old specimen and Day's figure is copied from it. Nobody knew that the lateral blotch was probably totally faded. Its presence is stated by Steindachner (1893), Ahl (1923), Herre & Montalban (1929) and evidently induced Ogilby in 1910 to name a specimen from Moreton Bay, Australia, with the lateral blotch, which remembered him of *Ch. speculum*, *maculiceps* as he did not know Steindachner's ample description from 1893, but only the descriptions after Broussonet's faded specimen. Fowler & Bean err in an other sense. They recognise both species but say that *Ch. maculiceps* appears to be distinct from *Ch. plebeius* in the presence of the dark blotch on the caudal peduncle. This blotch is in both present, but in the original descriptions of *plebeius* after Broussonet's type the large lateral blotch was ommitted.

By some authors *plebeius* is included in the genus *Megaprotodon* on account of its four or five anal spines, but we are of the opinion of Herre & Montalban, that it differs strongly in the arrangement of the scales and belongs also in other regards in the group of the true Chaetodon s.str. But to lay some stress upon the difference in the anal spines we propose to give it the subgeneric name of: *Tetrachaetodon.*

2. Subgenus **Rhabdophorus** Swainson.

(Swainson, Classification Fishes II, 1839, p. 21)
[Type: *Chaetodon ephippium* C. V.] cfr. page 53.

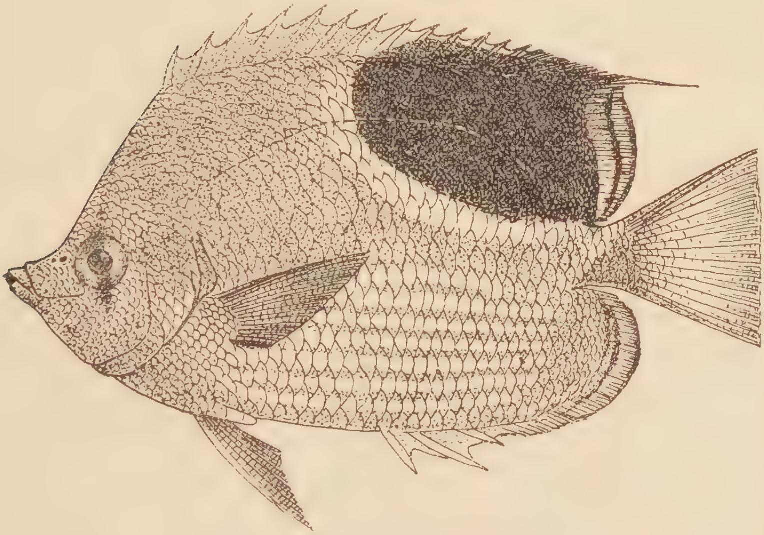

Fig. 19. *Chaetodon (Rhabdophorus) ephippium* C. V. n. s.

4. **Chaetodon (Rhabdophorus) ephippium** C. V. (Fig. 19).

Chaetodon ephippium Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 80.
Chaetodon principalis Cuvier & Valenciennes, loc. cit. p. 81 (a fictive fish).
Chaetodon ephippium Lesson, Voy. Coquille, Zool. II, 1831, p. 174.
Chaetodon garnoti Lesson, ibidem (as synonym).
Rhabdophorus ephippium Swainson, Nat. Hist. Fishes II, 1839, p. 211.
Chaetodon ephippium Bleeker, Nat. Tijdschr. Ned. Indië V, 1853, p. 337.
Chaetodon ephippium Montrouzier, Ann. Sc. Phys. Soc. d'Agricult. Lyon (2) VIII, 1856, p. 440.
Chaetodon mulsanti Thiollière, Fauna Woodlark, 1857, p. 163.
Chaetodon ephippium Günther, Cat. Brit. Mus. II, 1860, p. 7.
Chaetodon ephippium Kaup, Arch. f. Naturgesch. XXVI, 1860, p. 15.

Tetragonoptrus ephippium Bleeker, Nederl. Tijdschr. Dierk. I, 1863, p. 234.
Chaetodon ephippium Günther, Brenchley's Cruise „Curaçao" 1873, p. 409. — Fische Südsee 1873—75, p. 36.
Rhabdophorus ephippium Bleeker, Arch. Néerl. Sc. Nat. XI, (1875) 1876, p. 305.
Tetragonoptrus (Rabdophorus) ephippium Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877, p. 65. — Atl. ichth. IX, 1877, p. 36.
Chaetodon ephippium Macleay, Proc. Linn. Soc. N. S. Wales VII, 1882, p. 241.
Chaetodon ephippium De Vis, loc. cit. IX, 1884, p. 453.
Chaetodon ephippium Pellegrin, Bull. Mus. Hist. Nat. IV, 1898, p. 229.
Chaetodon ephippium Seale, Occas. Papers Bishop Mus. I, 1901, p. 97.
Chaetodon ephippium Jordan & Seale, Bull. Bur. Fish. XXV, (1905) 1906, p. 343.
Chaetodon ephippium M. Weber, Fische Siboga-Exp. 1913, p. 307.
Chaetodon ephippium Ahl, Arch. Naturgesch. LXXXIX, 1923, p. 65.
Chaetodon ephippium var. *principalis* Ahl, loc. cit. p. 66.
Chaetodon ephippium Herre & Montalban, Philippine Journal Sci. XXXIV, 1927, p. 56.
Chaetodon ephippium Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 245.
Chaetodon ephippium Fowler & Bean, Bull. U. S. Nat. Mus., vol. 8, 1929. p. 70.
Chaetodon ephippium Herre, Notes Fish. Zoolog. Mus. Stanford Univ. 1931, p. 59.

D. XIII, 24—26; 1) A. III, 21—22; L. r. 34—37; L. tr. $\frac{9-10}{15-16}$.

Compressed, oval; height 1.6—1.7, head 3—3.5 in length; rostrodorsal profile strongly concave before eye, hence rising in a convex sharp line. Eye somewhat more or less than 4 in head, about one half to nearly twice shorter than snout and conspicuously shorter than convex interorbital space. Snout conical, pointed, horizontally produced; cleft of mouth oblique, lower jaw prominent; setiform brush-like teeth in anterior part of jaws, denser and longer in mandible, more distant and in a single series in lateral parts of upper jaw. Preoperculum finely denticulate at its angel. Scales large on trunk, in regular transverse and longitudinal series, those in lower half nearly horizontal; scales becoming small to minute on head and median fins.; lateral line strongly arched, terminating a little before end of dorsal. Spinous dorsal longer than soft; spines strong, in adult increasing in height posteriorly, the longest somewhat less than length of head without snout, in young the median spines are the longest; soft dorsal rounded posteriorly, its fourth and fifth ray filiform produced, this prolongation is still wanting in juvenile specimens. Anal spines strong, second and third subequal, shorter than head without snout, rayed anal rounded; caudal slightly double concave, the marginal ray a little produced as a short filament; least height of caudal peduncle more

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1) The dorsal spines may by exception number XII or XIV.

than diameter of eye. Pectorals acutely rounded, shorter than head; ventrals acute, of about same length, their spine twice length of eye. Colour in alcohol paler or darker gray, especially in upper half of body, lower half with diffuse violet longitudinal stripes running parallel to series of scales; a subovate black patch, with broad superior and inferior white margin, occupies the posterior superior part of the back and the greatest part of the dorsal; anal with an intramarginal line; below fourth dorsal spine a more or less pronounced line running towards operculum and a faint streak from front through eye ending below it, which may be wanting but which in young is better developed as an ocular band which is united below isthmus with its fellow; the young have also a transverse brown patch on caudal peduncle which disappears with age. Length up to 300 mm.

Habitat: Java; Cocos Isl.; Flores; Celebes (Menado, Limbo Strait); Saleyer!; Togian Isl.; Ternate; Tidore; Ceram!; Ambon!; Nusa Laut!; Haruku; Goram; Mysore; Kei Isls.!; New Guinea (Geelvink Bay!). — Philippines, China, Queensland, Bismarck Arch., Woodlark, Marianas, Solomon Isl., Marshall Isl., Polynesia to Hawaii.

Note. The question about *Ch. principalis* C. V., distinguished by a black area, edged with white, on and above the anal, similar to the dorsal patch, and generally identified with *Ch. epiphippium* or considered as a colour variety or as a juvenile state, is still an open one. The french authors, describing it after the drawings of Renard and Valentijn, took it for a fictive fish. Bleeker is of the same opinion, but Jordan & Seale (loc. cit. p. 343) described a specimen from Samoa of the same colour, which, while young, they considered to be the juvenile state of *Ch. ephippium*; but Bleeker decribed a series of specimens of 42—285 mm. length of that species, none of whom show the quoted character of *principalis*. Ahl learned the same from his young specimens and therefore concludes, that *principalis* is a rare variety of *ephippium*.

2. **Chaetodon (Rhabdophorus) semeion** Blkr.

Chaetodon semeion Bleeker, Nat. Tijdschr. Ned. Indië VIII, 1855, p. 450.
Chaetodon semeion Günther, Cat. Brit. Mus. II, 1860, p. 7. — Südsee-Fische 1874, p. 37.
Tetragonoptrus (Rhabdophorus) semeion Blkr, Versl. Akad. Amsterdam (2) X, 1876, p. 316. — Verh. Akad. Amsterdam XVII, (1876) 1877, p. 67. — Atl. ichth. IX, 1877, p. 37.
Chaetodon semeion Fowler, Proc. Acad. Sci. Philadelphia 1899, p. 492.

Chaetodon semeion Jordan & Seale, Bull. Bur. Fish. XXV, (1905) 1906, p. 343.
Chaetodon semeion Seale, Occas. Papers Bishop Mus. IV, 1906, p. 65.
Chaetodon semeion Steindachner, Fischfauna Samoa 1906, p. 1390.
Chaetodon semeion Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 69.
Chaetodon semeion Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 246.
Chaetodon semeion Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929. p. 79.

D. XIV, 25—27; A. III, 23—24; L.r. 30—31; L. tr. $\frac{6}{13-15}$.

Oval, height about 1.6, head 3.5 to about thrice in length; ventral profile less convex than dorsal; rostro-dorsal profile deeply concave before eye, thence convex till dorsal. Eye 3.5 to more than 4 in head; its diameter shorter than convex interorbital space and one third or more shorter than prominent, pointed snout, with oblique cleft and somewhat longer lower jaw. Both jaws with bands of setiform, prominent oblique teeth, those in lower jaw the longest. Preoperculum with rounded angel, slightly denticulate. Lateral scales on trunk of moderate size, arranged in dorsally very slightly ascending series, diminishing in size hindwards, dorsally and on head and median fins. Lateral line arched, terminating near end of soft dorsal. Spinous dorsal much longer than soft, with strong spines, the two anterior subequal, the following gradually increasing in height posteriorly, the last shorter than head without snout and nearly as high as rounded soft dorsal, the second and third ray of which is prolonged into a filament and reaches or surpasses the caudal. Soft anal similarly rounded, the anal spines strong, the second and third subequal, the longest about thrice in head. Pectorals acute, shorter than head; ventrals acute, as long as pectorals, their spine about half length of head. Caudal somewhat emarginate, with a short slender superior and inferior filament. Least height of caudal peduncle longer than eye. Colour in alcohol yellow, centre of scales on body with a small dark dot, a brown band from origin of dorsal through eye, getting broader to isthmus; soft dorsal with a broad, soft anal with a narrow basal brown band, both with a light margin and a dark submarginal line, continued from base of spinous dorsal; paired fins and caudal more or less yellow. Length up to 235 mm.

Habitat: Cocos Isl.; Celebes (Menado, Buka Buka Isl., Sadaa Isl.); Tidore Isl., Goram; New Guinea. — Philippines, Bismarck Archipelago, Solomons, Carolines, Polynesia, Tonga Ild.! —

3. **Chaetodon (Rhabdophorus) bennetti** C. V.

Chaetodon Bennetti Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 84.
Chaetodon vinctus Bennett, in Beechey's Voyage, Ichth. 1839, p. 62.

Chaetodon Bennetti Bleeker, Nat. Tijdschr. Ned. Indië IV, 1853, p. 467. — Acta Soc. Sc. Indo-Neerland. VIII, 1860, Chaetodont. p. 26.
Chaetodon bennetti Günther, Cat. Brit. Mus. II, 1860, p. 12.
Coradion bennetti Kaup, Arch. f. Naturgesch. XXVI, 1860, p. 147.
Sarothrodus Bennetti Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 156.
Chaetodon Bennetti Kaup, Ned. Tijdschr. Dierk. I, 1863, p. 164.
Tetragonoptrus Bennetti Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 286.
Chaetodon bennetti Playfair in Playfair & Günther, Fish. Zanzibar 1866, p. 33.
Chaetodon bennettii Günther, Fische Südsee 1874, p. 37.
Tetragonoptrus (Rabdophorus) Bennetti Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877, p. 60. — Atl. ichth. IX, 1877, p. 34.
Chaetodon Bennetti Macleay, Proc. Linn. Soc. N. S. Wales VII, 1882, p. 241.
Chaetodon Bennetii (sic) Sauvage, Poiss. Madagascar 1891, p. 515.
Chaetodon bennetti Jordan & Seale, Bull. Bur. Fish. XXV, (1905) 1906, p. 345.
Chaetodon Bennetti Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 73.
Chaetodon bennetti Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 65.
Chaetodon bennetti Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 244.
Chaetodon bennetti Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 73.
Chaetodon bennetti Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 59.
Rhabdophorus bennetti Whitley, Great Barrier Reef Exp. 1932, p. 288.

D. XIV, 17—18, A. III, 15—16; L. r. 45—46; L. tr. $\frac{9-10}{18-20}$.

Oval, moderately compressed, dorsal and ventral profile nearly equally convex, rostro-dorsal profile ascending in an oblique, slightly concave line. Height about 1.5, head small, more or less than 3.5 in length. Eye somewhat before middle of head, 3—3.5 in length of head, about equal to convex interorbital space. Blunt snout not prominent, scarcely longer than eye; cleft of mouth small, somewhat oblique, with equal jaws, armed with rather broad bands of setiform teeth, the lower ones the longest. Preoperculum denticulate. Scales moderate, gradually decreasing in size posteriorly, much smaller on head and median fins, on trunk arranged in more or less horizontal series; lateral line slightly arched, terminating at end of dorsal. Spinous dorsal nearly twice longer than soft dorsal; the spines strong, the middle ones the highest, gradually decreasing in height towards soft dorsal, their membrane deeply incised; the posterior spines subequal, much shorter than half lenght of head, their membrane complete; soft dorsal obtusely rounded, somewhat higher than spinous. Rayed anal of similar form, anal spines strong, the first of about half length of second and third. Pectorals and ventrals acute, shorter than head; ventral spine strong, shorter than head without snout. Caudal truncate, least height of caudal peduncle nearly equal to postorbital part of head. Colour yellow, a brown band bordered with white from neck through eye to below isthmus, somewhat narrower than eye; a large oval brown white-edged blotch, crossed in its upper half by the lateral line, situated below posterior dorsal spines; two divergent bluish curved bands descending from top of branchial opening towards lower half of trunk and terminating the lower before anal, the upper above anterior half of anal; caudal peduncle with an orange transverse band, continued along base of soft dorsal and anal; faint narrow bands concurrent with the series of scales on trunk; caudal with a transparent border. Length 180 mm.

Habitat: Java (Batavia); Sumatra (Priaman); Celebes and some neighbouring Islands; Ambon!; Banda Sea!; Halmaheira; Misol; New Guinea. — Zanzibar, Apaman Isl.!, Mikandani (East Africa), Madagascar, Philippines, Solomon Ils., Polynesia.

4. **Chaetodon (Rhabdophorus) speculum** C. V.

Chaetodon speculum Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 73 (after incomplete figure of Kuhl & v. Hasselt).

Chaetodon spilopleura Cuvier & Valenciennes, loc cit. p. 74 (after figure of Reinwardt).

Chaetodon speculum Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 242.

Chaetodon speculum Günther, Cat. Brit. Mus. II, 1860, p. 12.

Citharoedus speculum Kaup, Arch. f. Naturgesch. XXVI, 1860, p. 145.

?Citharoedus spilopleura Kaup, loc. cit. p. 146.

Chaetodon speculum Kaup, Ned. Tijdschr. Dierk. I, 1863, p. 129.

Tetragonopterus speculum Bleeker, loc. cit. II, 1865, p. 189.

Tetraganoptrus (Rhabdophorus) speculum Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877, Chétodont. p. 62. — Atl. ichth. IX, 1877, p. 34.

Chaetodon speculum Macleay, Proc. Linn. Soc. N. S. Wales VII, 1882, p. 242.

Chaetodon speculum Meyer, An. Soc. Española, Hist. Nat. XIV, 1885, p. 17.

Chaetodon speculum M. Weber, Fische Siboga-Exp. 1913, p. 304.

Chaetodon speculum Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 75.

Chaetodon speculum Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 66.

Chaetodon speculum Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 245.

Cheatodon speculum Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 75.

Chaetodon speculum Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 60.

D. XIV, 17—18; A. III, 15—16; L.r. 40—42; L.tr. $\frac{9}{17-18}$.

Oval, dorsal outline more convex than ventral, rostro-dorsal profile in its lower half slightly concave, in its upper half somewhat convex; height about 1.6, head 3.4—3.5 in length. Eye thrice or less in head, situated nearly in middle of head, shorter than convex interorbital space, somewhat longer than snout. Cleft of mouth nearly horizontal, the jaws even with bands of setiform teeth. Preoperculum scarcely denticulate. Scales moderate, diminishing in size posteriorly, still smaller on head and median fins, longitudinal series of scales horizontal in inferior half of trunk, in superior half slightly ascending dorsally and somewhat arched; lateral line conspicuously arched, the last sensory scales abruptly descending towards axil of soft dorsal. Spinous dorsal twice longer than soft; first and second spine the shortest, fourth and fifth the longest and strongest, the eight posterior nearly subequal with more complete interspinous membranes than the anterior. Soft dorsal and anal rounded and of about equal extension; anal spine strong, the second most so and the longest, about as long as head without snout. Pectorals and ventrals somewhat shorter than head; spine of ventrals about two third of its fin. Caudal somewhat convex, least height of its peduncle longer than eye. Colour in alcohol uniform yellow, longitudinal series of scales of trunk with a faint darkish line, fading in alcohol; a blackish band, narrower than eye, descending from neck through eye towards chest, getting broader ventrally; a blackish or brown oval blotch, as long as or slightly longer than head, crossed in its superior half by lateral line, on upper side of trunk, below anterior half of spinous dorsal, this blotch is in the Tholichthys-stage of 12 and 15 mm. length ventrally oval, on a juvenile specimen of 28 mm. nearly round, getting horizontally oval later on, the only other difference from the full grown pattern is a black margin of the soft anal, most conspicuous in the youngest. Caudal with hyaline border. Length 130 mm.

Habitat: Java; Bawean; Celebes (Menado); Halmaheira; Ceram; Ambon!; Banda; Buton-Strait!; Kei Isls. (Tual)!; New Guinea. — Philippines, Formosa, New-Pommern, Matupi.

Note: M. Weber (loc. cit.), Herre & Montalban (loc. cit.) and Fowler & Bean (loc. cit.) cite in their synonymy of *Ch. speculum* also *Ch. zanzibariensis* Playfair, an opinion already expressed by Bleeker in his Révision des Chétodontoides from 1877 and repeated in his Atlas; evidently contrary to his Enumération des Poissons de Madagascar from 1875, where *Tetragonopterus Zanzibariensis* is listed as a proper species. *Chaetodon Zanzibariensis* was first described by Playfair in Playfair & Günther, (Fishes Zanzibar 1866) from Zanzibar and later named by him also from the Seychelles and by Pfeffer (Jahrb. Hamburger wissensch. Anstalten VI, 1889, p. 22; and X, 1893, p. 8) from Zanzibar and Bani (East Africa) 1). Ahl (Arch. f. Naturgesch. LXXXIX, 1923, p. 76),

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1) Pfeffer (loc. cit.) calls them wrongly „*Zanzibaricus*".

who could dispose of 7 specimens and could compare them with *Ch. speculum* treats them as a proper species. Perhaps it is more correct to value *Zanzibariensis* as a geographical subspecies restricted to the coast of tropical East Africa and the Seychelles and differing from *speculum* 1. by smaller scales (40—42 against 47—48 in longitudinal line). 2. by a less arched lateral line. 3. by a much smaller black blotch on sides of trunk, which is much shorter than head.

3. **Chaetodon (Rhabdophorus) trifasciatus** Mungo Park.

Chaetodon trifasciatus Mungo Park, Trans. Linn. Soc. London, III, 1797, p. 34.
Chaetodon vittatus Bloch, Schneider, Syst. ichth. 1801, p. 227.
Chaetodon vittatus Cuvier & Valenciennes, Hist. nat. Poiss. 1831, p. 34.
Chaetodon tau-nigrum Cuvier & Valenciennes, loc. cit. p. 38.
Chaetodon austriacus Rüppell, Neue Wirbelth. Fische, 1835, p. 30.
Chaetodon bellus Lay & Bennet, in Beechey's Voy. 1839, p. 61 (name in synonymy after Solander).
Chaetodon vittatus Bleeker, Verh. Bat. Gen. XXIII (1849) 1850, Chaetodont. p. 18.
Chaetodon Layardi Bleeker, Verh. Batav. Gen. XXV, 1853, Ceylon p. 105.
Chaetodon vittatus Peters, Monatsber. Akad. Berlin, 1855, p. 438 (name only).
Chaetodon vittatus Montrouzier, Ann. Sc. phys. d'Agriculture, Lyon (2) VIII, 1856, p. 442.
Chaetodon ovalis Montrouzier, loc. cit. p. 442.
Chaetodon pepek Montrouzier, loc. cit. p. 443.
Chaetodon vittatus Günther, Cat. Brit. Mus. II, 1860, p. 23.
Chaetodon tau-nigrum Günther, loc. cit. p. 32.
Citharoedus vittatus Kaup, Arch. f. Naturgesch. XXVI, 1860, p. 142.
Citharoedus taunigrum Kaup, ibidem.
Citharoedus austriacus Kaup, ibidem.
Chaetodon vittatus Kaup, Ned. Tijdschr. Dierk. I, 1863, p. 128.
Chaetodon austriacus Kaup, ibidem.
Sarothrodus vittatus Bleeker, Nederl. Tijdschr. Dierk. I, 1863, p. 156.
Tetragonoptrus vittatus Bleeker, loc. cit. p. 234.
Chaetodon vittatus Kner, Novara-Exp. Fische 1865—67, p. 100.
Chaetodon vittatus Guichenot, Mém. Soc. Sc. Nat. Cherbourg (2) XII, 1866, p. 145.
Chaetodon trifasciatus Playfair Fish. Zanzibar, 1866, p. 34.
Chaetodon vittatus Klunzinger, Verh. Zool. Bot. Ges. Wien XX, 1870, p. 782.
Chaetodon vittatus Günther, Fische Südsee, 1874, p. 41.
Chaetodon tau-nigrum Günther, loc. cit. p. 47.
Tetragonoptrus (Rhabdophorus) trifasciatus Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877, Chétodont. p. 63. — Atl. ichth. IX, 1877, p. 35.
Chaetodon klunzingeri Kossmann & Räuber, Verh. Nat. Med. Verein Heidelberg I, 1876, p. 19.
Chaetodon trifasciatus var. *Kluzingeri* Kossman & Räuber, Zool. Erg. Reise Roth. Meer. 1877, p. 13.
Chaetodon vittatus Day, Fish. India 4° 1878—88, p. 107.

Chaetodon vittatus Macleay, Descr. Cat. Austral. Fish. I, 1881, p. 89.
Chaetodon trifasciatus var. *austriacus* Klunzinger, Fische Roth. Meer. 1884, p. 55.
Chaetodon (Tetragonoptrus) trifasciatus Sauvage, Poiss. Madagascar 1891, p. 254.
Chaetodon trifasciatus Pfeffer, Jahrb. wissensch. Anstalt. Hamburg 1893, p. 8.
Chaetodon trifasciatus var. *arabica* Steindachner, Denkschr. Akad. Wien LXXI, 1902, p. 138.
Chaetodon trifasciatus Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII (1903) 1905, p. 372.
Chaetodon trifasciatus M. Weber, Fische Siboga-Exp. 1913, p. 304.
Chaetodon trifasciatus Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 56.
Chaetodon trifasciatus subsp. austriacus Ahl, loc. cit. p. 57.
Chaetodon trifasciatus subsp. caudifasciatus Ahl, ibidem.
Chaetodon trifasciatus subsp. arabica Ahl, loc. cit. p. 58.
Chaetodon trifasciatus Herre & Montalban, Philippine Journal Sci. XXXIV, 1927, p. 63.
Chaetodon trifasciatus Duncker & Mohr, Mitt. Zool. Mus. Hamburg XLIV, 1929, p. 73. (Tholichthys).
Chaetodon trifasciatus Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 65.
Chaetodon trifasciatus Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 60.

D. XIII, 21—23 1); A. III, 19—20; L. r. ca 38; L. tr. $\frac{5-6}{13-14}$.

Oval, posteriorly strongly compressed, back and postanal outline trenchant; height 1.5—1.8, head 3.2—3.5 in length, its rostrodorsal profile ascending in a steep line. Eye 2.5—3, equal to or slightly shorter than broad convex interorbital space, conspicuously greater than short, bluntly rounded snout. Mouth small, horizontal; setiform teeth in a brush-like bundle, the mandibulary ones the longer; preoperculum finely serrated. Scales rounded, those on trunk in regular longitudinal and transverse series, the most superior and inferior curved, the median slightly ascending, decreasing in size posteriorly, also on head, chest and on median fins; lateral line running in a slightly curved line towards anterior third of rayed dorsal, reappearing again on caudal peduncle. Spinous dorsal nearly one third longer than soft, its spines strong, the middle ones the longest and strongest, shorter than head without snout, the ultimate ones weaker, as high as the anterior rays of the obtusely rounded soft dorsal, the median and postmedian rays of which are the longest; soft anal less high, it terminates angularly, second and third anal spine subequal, more or less than $1^1/_2$ times in length of head; pectorals acutely rounded, equal head; ventrals shorter, acute, not reaching vent, their spine equals head without

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1) By exception there are XII or XIV spines.

snout. Caudal convex, least height of its peduncle as long as diameter of eye. Colour in alcohol gray or pale brownish with parallel, somewhat oblique or curved longitudinal dark brown stripes on body, head with a blackish ocular band from neck to chest, separated by white from blackish snout and from a narrow curved stripe along the preopercular margin; a similar cuneiform, yellow-edged band from origin of soft anal to back of caudal peduncle, where it is broadest, a similar band along base of anal and across caudal, soft anal along its middle with a diffuse reddish stripe; pectorals and ventrals whitish. Length 120 mm.

Nom. indig. Kepper-laut (Malay, Batavia).

Habitat: Singapore!; Batu Isl.; Pulu Weh (Sabang!); Java (Batavia)!; Cocos Isl.; Flores; Solor!; Timor!; Borneo; Celebes (Makassar!, Menado); Saleyer!; Binongka!; Karkaralong Isl.!; Sanguisapo; Doworra; Talisse; Ternate!; Obi major; Ambon!; Haruku; Buru!; Ceram!; Halmaheira; Banda!; Kei Isl.!; Aru; Waigeu; Goram; New Guinea. (Skru!, Astrolabe Bay!). — Red Sea, Zanzibar, Mozambique, Madagascar, India, Formosa, Philippines, Australia (Western Australia, Cape York, Port Jackson), Marianas, Bismarck Arch., Woodlark, Lord Howe Isl., Solomon Isls., Polynesia till Hawaii Isl.

Note. The present species, especially abundant in the indo-australian Archipelago, has a wide distribution on the coral reefs of the Indo-Pacific from the Red Sea, the East coast of Africa, Madagascar, over India, Formosa, Philippines, Australia, Melanesia, Micronesia, Polynesia to the Hawaiian Islands. In general it has a constant colour pattern with slight variation. But there are described some more pronounced varieties even as proper species, memorized in our synonymy:

Ch. austriacus Rüppell, (Neue Wirbelth. Fische 1835, p. 30), which differs from the typical pattern by a black tail and caudal, with a broad whitish margin, a yellow dorsal, its soft part with a black stripe and an orange margin; anal black with a yellow basal line and an orange margin. This variety seems to be restricted to the Red Sea.

Ch. trifasciatus var. *arabica* Steindachner, from the Arabian coast is amply described by its author.

Ch. trifasciatus var. *Klunzingeri* Kossmann & Räuber is according to Ahl (loc. cit. p. 59) the young stage of var. *arabica*.

Ch. trifasciatus subsp. *caudifasciatus* Ahl. A colour variety described by Ahl (loc. cit. p. 57) from specimens from the West coast of Sumatra, distributed also over Madagascar to the East coast of Africa.

Ch. tau-nigrum C.V. is after Ahl (loc. cit. p. 59) the juvenile stage of *Ch. trifasciatus* as he could dispose of all transitional stages, an opinion shared by Sauvage who saw the type at Paris.

Fowler & Bean cite in the synonymy of *Ch. trifasciatus* also *Chaetodon melapterus* Guichenot, (Notes I Réunion, V vol. 2, 1862, p. 6). This is evidently a mistake, as it appears again on page 70 of their elaborate paper as a proper species; the validity of which was confirmed by Sauvage, who had the benefit to see the original specimen from Réunion.

3. Subgenus **Citharoedus** Kaup.

(Kaup, Arch. f. Naturgeschichte XXVI, 1860, p. 136) emend. Bleeker. [type: *Chaetodon* meyeri Bl., Schn.] cfr. pag. 54.

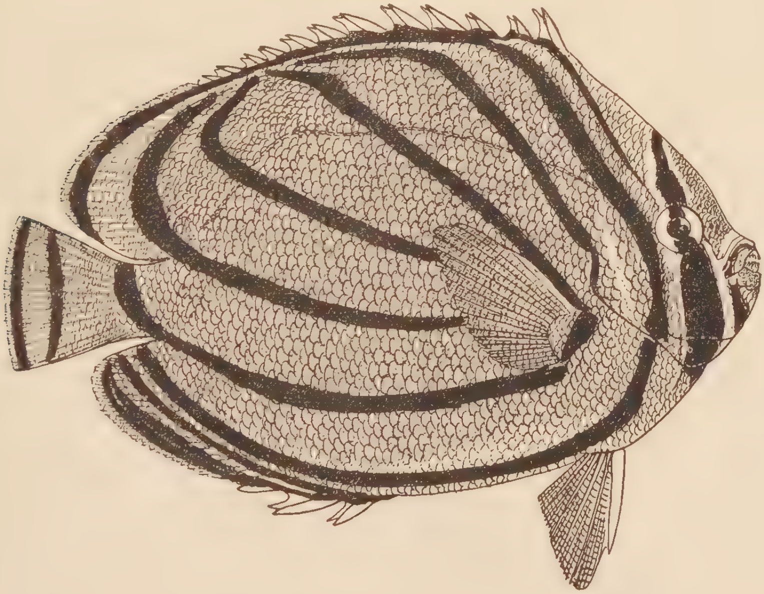

Fig. 20. *Chaetodon* (*Citharoedus*) meyeri Bloch, Schneider, × 2/3.

1. **Chaetodon (Citharoedus) meyeri** Bloch, Schneider. (Fig. 20).

Chaetodon meyeri Bloch, Schneider, Syst. ichth. 1801, p. 233.
Holacanthus flavo-niger Lacépède, Hist. nat. Poiss. IV, 1802 pp. 529, 535.
Chaetodon meyeri Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 19.

Chaetodon meyeri Bleeker, Act. Soc. Sc. Indo-Neerl. I, 1856, p. 37. — loc. cit. VIII, 1860, p. 34.
Chaetodon meyeri Günther, Cat. Brit. Mus. II, 1860, p. 13.
Citharoedus meyeri Kaup, Arch. f. Naturgesch. XXVI, 1860, p. 141.
Tetragonopterus meyeri Bleeker, Nederl. Tijdschr. Dierk. I, 1863, p. 234.
Tetragonoptrus (Citharoedus) meyeri Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877, Chétodont. p. 55. — Atl. ichth. IX, 1877, p. 32.
Chaetodon meyeri Lunel, Mém. Soc. Phys. Nat. XXVII, 1881, p. 270.
Chaetodon meyeri Steindachner, Abh. Senckenberg. Nat. Ges. XXV, 1900, p. 420.
Chaetodon meyeri M. Weber, Fische, Siboga-Exp. 1913, p. 305.
Chaetodon meyeri Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 49.
Chaetodon meyeri Fowler & Bean, Bull. U. S. Nat. Mus. vol. 8, 1929, p. 60.

D. XII, 23—25; A. III, 19—21; L. r. 50—55; L. tr. $\frac{8-9}{22-24}$.

Compressed, oval; height about 1.4, head 3.2—3.5 in length. Rostro-dorsal profile obliquely ascending. Eye 3—3.7, its diameter much less than broad convex interorbital space and slightly less than obtuse, broad snout. Mouthopening small but broad and curved; a series of setiform brown margined teeth in front part of jaws. Preoperculum scarcely denticulate. Scales regularly rounded, of moderate size, decreasing somewhat in size on head, chest and posteriorly, rather minute on median fins; lateral line concurrent with dorsal profile till about last dorsal spine where it is sharply deflected, runs downwards and terminates below last third of soft dorsal. Spinous dorsal slightly longer than soft; anterior spines strongest decreasing in strength, not in height posteriorly; the second and third anal spine the longest, nearly equal to half length of head; soft dorsal and anal rounded; pectorals rounded, nearly equal to length of head; ventrals acute, longer than head without snout, their spine slightly shorter; caudal rounded, the least height of its peduncle as long as postocular part of head. Groundcolour in alcohol pale brownish or pearl colour, with curved black stripes, which show some variety in their arrangement; most constant are: one round the mouth, one from front to isthmus with preorbital narrow interruption, an ocular one across the eye to chest, where it is united with its fellow, all these stripes are more or less conspicuously separated by white lines; a similar one on opercle, before it a fourth stripe from anterior dorsal spines, continued along upper margin of dorsal and across preoperculum bent downward to base of ventral and hence along belly to base of anal: usually a fifth stripe divides on base of pectoral in two, the anterior of which arches to middle of spinous dorsal, runs along it and returns to point of pectoral, while the posterior stripe ascends to end of spinous dorsal, a concentric stripe curves from dorsal to base of pectoral, an other from hence to caudal peduncle which it crosses; caudal crossed by two narrow stripes, soft dorsal with an intramarginal light, in live red dot; soft anal with light margin followed towards base by broad dark band and usually by a second one separated by white; paired fins yellowish. Length 150 mm.

Habitat. Pulu Weh (Sabang Bay)!; Java; Borneo (Birabirakan Isl.); Celebes (Makassar!, Menado, Tanawanko, Libani Bay); Tidore; Buru; Ambon!; Haruku!; Nusa laut; Ceram!; Banda!; Timor; New Guinea (Doreh!). — Philippines, East Africa, Mauritius, Bismarck Arch., Marshall Isls. —

2. **Chaetodon (Citharoedus) ornatissimus** C.V.

Chaetodon ornatissimus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 32. (apud Solander).

Chaetodon ornatissimus Lesson, Zool. Voy. Coquille II, (1830) 1831, p. 179.

Chaetodon ornatus Gray, Zool. Miscellany, 1831, p. 33.

Chaetodon ornatissimus Bleeker, Act. Soc. Sc. Indo-Neerl. II, 1857, Ambon p. 55.

Chaetodon ornatissimus Günther, Cat. Brit. Mus. II, 1860, p. 15.

Citharoedus ornatissimus Kaup, Arch. f. Naturgesch. XXVI, 1860, p. 142.

Tetragonoptrus ornatissimus Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 286.

Chaetodon ornatissimus Günther, Fische Südsee, 1873—75, p. 38.

Tetragonoptrus (Citharoedus) ornatissimus Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877, Chétodont. p. 57. — Atl. ichth. IX, 1877, p. 32.

Chaetodon ornatissimus Macleay, Proc. Linn. Soc. N. S. Wales VIII, 1883, p. 262.

Chaetodon ornatissimus Fowler, Proc. Acad. Nat. Sci. Philadelphia 1900, p. 513.

Chaetodon ornatissimus Seale, Occas. Papers Bishop Mus. I, 1901, p. 100.

Chaetodon ornatissimus Jordan & Seale, Bull. Bur. Fish. XXV (1905) 1906, p. 345.

Chaetodon ornatissimus Jordan & Evermann, Bull. U.S. Fish. Comm. XXIII, (1903) 1905, p. 373.

Chaetodon ornatissimus Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 51.

Chaetodon ornatissimus var. *Kaupi* Ahl. loc. cit. p. 52.

Chaetodon ornatissimus Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 42.

Chaetodon ornatissimus Fowler, Fish. Oceania Bishop Mus. X, 1928, p. 243.

Chaetodon ornatissimus Fowler & Bean, Bull. U. S. Nat. Mus. vol. 8, 1929, p. 63.

Chaetodon ornatissimus Herre, Notes Fish. Stanford Univ. 1931, p. 60.

D. XII, 25—26; A. III 21—22; L.r. ca 50; L.tr. $\frac{10}{21-22}$.

Compressed, oval; height 1.5, head 3.1—3.6 in length. Rostrodorsal profile obliquely ascending in a nearly straight line. Eye 3—3.5, situated high above mouth, halfway head, equal to or one third shorter than broad, strongly convex interorbital space. Snout bluntly rounded, scarcely protruding, equal to or slightly shorter than diameter of eye. Preoperculum finely denticulate. Setiform teeth in anterior part of jaws; the mandibulary ones the longest. Scales rounded, moderate, smaller on head, chest and median fins; on trunk in regular longitudinal and transverse series; lateral line arched parallel with dorsal convexity till last dorsal spine, hence deflected toward termination of dorsal but ending before it. Spinous dorsal somewhat longer than soft; first spine a little longer than the second, the following somewhat increasing in height posteriorly, the last about as long as head without snout; about the six anterior spines alternately stronger and heteracanth; soft dorsal rounded, obtusely angulate in its last third. Anal spines strong, second about half length of head, third subequal, soft anal rounded. Pectorals and ventrals about equal to head, ventral spine strong, shorter. Caudal nearly truncate, least height of its peduncle more than twice in length of head. Colour in alcohol paler or deeper yellow, head more or less reddish with six darker transverse bands: the first across the lower lip, the second around snout, the third from front to below isthmus through eye but much smaller than it, the fourth across preoperculum and continued along margin of sheath of dorsal, the fifth much narrower and smaller across operculum, a short sixth may be present near border of operculum; some of them with a light margin; body with six to seven oblique longitudinal bands reaching dorsal, caudal peduncle and anal; soft dorsal and anal with a narrow blackish margin, sheath of soft anal with a black margin; caudal with two transverse streaks, pectorals and ventrals yellowish. Length 180 mm.

Habitat: Pulu Weh!; Celebes; Tidore; Ambon!; Nusa Laut; New Guinea (Doreh, Astrolabe Bay!, Eeastern part of island). — Philippines, Marianes, Polynesia till Hawaiian Ils.

4. Subgenus **Tetragonoptrus** Klein.

(*emendavit* Bleeker, Arch. Néerl. Sc. Nat. XI, 1876, p. 305.)
[Type: *Chaetodon octofasciatus* Bloch.] cfr. page 55.

1. **Chaetodon (Tetragonoptrus) octofasciatus** Bloch.
(Fig. 21 and 22).

Chaetodon octofasciatus Bloch, Ausl. Fische III, 1787, p. 113.
Chaetodon octofasciatus Bloch, Schneider, Syst. Ichth. 1801, p. 223.
Chaetodon octofasciatus Lacépède, Hist. Nat. Poiss. IV, 1802, pp. 460, 491.
Chaetodon octofasciatus Cuvier & Valenciennes, Hist. Nat. Poiss. VII, 1831, p. 17.

Chaetodon octofasciatus Bleeker, Nat. Geneesk. Arch. Ned. Indië (3) II, 1845, p. 520. — Journ. Ind. Archipelago II, 1848, p. 633.
Chaetodon octolineatus Gray, Cat. Fish. Gronow II, 1854, p. 69.
Chaetodon octofasciatus Günther, Cat. Brit. Mus. II, 1860, p. 17.
Citharoedus octofasciatus Kaup, Arch. f. Naturgesch. XXVI, 1860, p. 142.
Chaetodon octofasciatus Kner, Fische Novara-Exp. 1865, p. 98.
Tetragonopterus octofasciatus Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 286.
Chaetodon octofasciatus Günther, Brenchley's Cruse „Curaçao" 1873, p. 410.
Chaetodon octolineatus Day, Fish. India 4°, 1876, p. 108.
Tetragonoptrus (*Tetragonoptrus*) *octofasciatus* Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877, Chétodont. p. 70. — Atl. ichth. IX, 1877, p. 38. — Arch. Néerl. Sc. nat. XIII, 1878, p. 44.

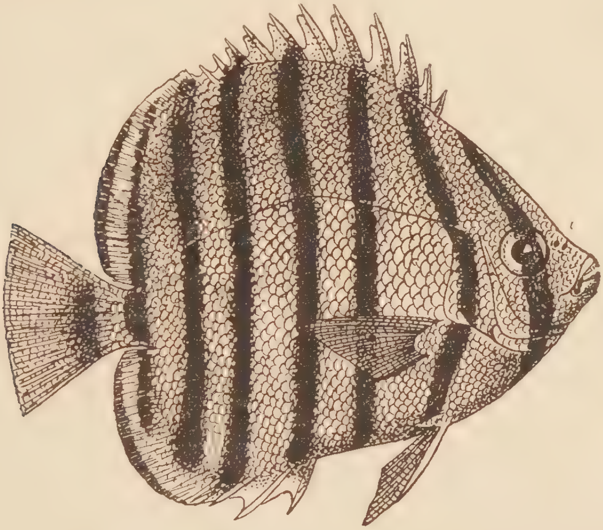

Fig. 21. *Chaetodon* (*Tetragonoptrus*) *octofasciatus* Bloch. n.s.

Chaetodon octofasciatus Duncker, Mitth. Naturh. Mus. Hamburg XXI, 1904, p. 151.
Chaetodon octofasciatus Pellegrin, Bull. Soc. Zool. France XIII, 1905, p. 84.
Chaetodon octofasciatus Evermann & Seale, Bull. Bur. Fish. XXVI, 1906, p. 96.
Chaetodon octofasciatus Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 84.
Chaetodon octofasciatus Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 39.
Chaetodon octofasciatus Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 247.
Chaetodon octofasciatus Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 93.
Chaetodon octofasciatus Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 60.

D. XI, 18—20 (rarius XII, 18); A. III, 16—17; L.r. 45—46; L.tr. $\frac{10}{20}$.

Orbicular, dorsal profile somewhat more elevated than ventral, rostro-dorsal profile steep and nearly straight. Height 1.4—1.5, head 3—3.5 in length. Eye situated with its anterior half in anterior half of head, somewhat shorter than convex interorbital space and equal to or scarcely shorter than obtuse rounded snout, with small cleft of mouth and even jaws, armed with small setiform teeth. Preoperculum scarcely denticulate. Scales small, arranged in subhorizontal longitudinal series, diminishing in size posteriorly, still smaller on head and median fins; lateral line moderately arched, terminating some scales before axil of soft dorsal. Spinous dorsal subequal to soft, spines relatively strong, the median ones the highest, conspicuously heteracanth, the longest equal to head without snout, the last shorter than half head, membrane only between last spines complete; scaly sheath wanting in anterior half of spinous fin, covering only its posterior half in an oblique ascending line; soft dorsal and anal bluntly rounded; anal spines strong, middle one the longest, equal to head without snout. Pectorals broad, shorter than head. Ventrals pointed, nearly reaching anal, their spine shorter than head. Caudal convex, least height of its very short peduncle more than eye. Colour in alcohol yellowish, greyish on ventral side of head and body, on each side six complete transverse blackish brown bands separated by wide interspaces, the first from neck through eye to chest, the second and third likewise curved before and behind pectoral, the following three from dorsal to anal, the seventh band constituted by a vertical part on soft dorsal and anal, completed by a transverse band on root of caudal peduncle, the eigth by a similar band on base of caudal; soft dorsal and anal with a white-edged brown margin, a median longitudinal black stripe from front to lip. Length up to 100 mm.

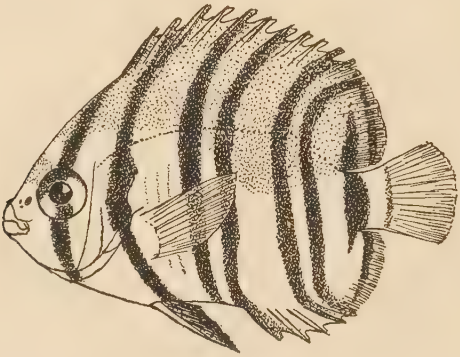

Fig. 22. *Chaetodon* (*Tetragonoptrus*) *octofasciatus* Bloch., juvenis of 25 mm length with other arrangement of posterior bands. × 6.

Nom. indig. Kepper laut, Lépé-Lépé (Malay, Batavia).

Habitat: Singapore!; Banka; Java (Batavia!, Bantam); Bawean; Borneo; Duizend Isls; Sumbawa; Celebes (Makassar, Gulf of Boni); Togian Isl; Ceram!; Ambon; Halmahera; Misol; New Guinea. — Zanzibar (after Ahl), British India, Tonkin, Philippines, Bougainville, New Pommern, Solomons.

2. **Chaetodon (Tetragonoptrus) punctato-fasciatus.** C.V.

Chaetodon punctato-fasciatus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 28.
Chaetodon punctato-fasciatus Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 238.
Citharoedus punctato-fasciatus Kaup, Arch. f. Naturgesch. XXV, 1860, p. 144.
Chaetodon punctato-fasciatus Günther, Cat. Brit. Mus. II, 1860, p. 27.
Tetragonopterus punctato-fasciatus Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 242.
Chaetodon multicinctus Garrett, Proc. Calif. Acad. Nat. Sci. III, 1863, p. 65.
Chaetodon punctato-fasciatus Günther, Brenchley's Cruise „Curaçao" 1873, p. 410.
Chaetodon multicinctus Günther, Fische Südsee 1873—1875, p. 44.
Chaetodon punctato-fasciatus v. Martens, Preuss. Exp. Ost-Asien 1876, p. 323.
Tetragonoptrus (Tetragonoptrus) punctato-fasciatus Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877, Révision Chétodont. p. 74. — Atl. ichth. IX, 1877, p. 40. — Arch. Néerl. Sc. Nat. XIII, 1878, p. 44.
Chaetodon multicinctus Jenkins, Bull. U. S. Fish. Comm. XXII, (1902) 1904, p. 472.
Chaetodon multicinctus Snyder, loc. cit. p. 531.
Chaetodon punctato-fasciatus Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII, (1903) 1905, p. 369.
Chaetodon punctato-fasciatus Jordan & Seale, Bull. Bur. Fish. XXV, (1905) 1906, p. 343. — l.c. XXVI, (1906) 1907, p. 34.
Chaetodon punctato-fasciatus M. Weber, Fische Siboga-Exp. 1913, p. 308.
Chaetodon punctato-fasciatus Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, p. 56.
Chaetodon punctato-fasciatus Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 100.
Chaetodon punctato-fasciatus subsp. multicinctus Ahl, loc. cit. p. 101.
Chaetodon punctato-fasciatus Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 60.
Chaetodon punctato-fasciatus Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 248.
Chaetodon punctato--fasciatus Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 89.
Chaetodon punctato-fasciatus Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 60.

D. XIII, 22—24; A. III, 17—18; L.r. 32—35; L.tr. $\frac{7}{13-14}$.

Orbicular oval, dorsal and ventral profile nearly evenly convex; rostro-dorsal profile steeply ascending in a more or less undulating line; height 1.5—1.7, head 3.2—3.5 in length. Eye 2.8—3, a little anteriorly, above horizontal through commencement of gape of mouth, much larger than convex interorbital space and about equal snout, which is blunt and slightly produced and goes about thrice in length of head. Mouth very small; brushlike teeth in anterior part of jaws, very small above, longer below. Preoperculum entire or nearly so. Scales moderately large, rounded, on head, chest and median fins much smaller, on trunk inferiorly in nearly horizontal series, *superiorly in slightly ascending series;* lateral line moderately arched, terminating below base of dorsal. Spinous dorsal about the distance of the three anterior spines longer than evenly rounded soft dorsal, spines strong, the anterior, especially the second and third, longer than the posterior ones which are also more slender; anal rounded, second and third spines longest, about 1.6 in head. Pectorals little longer than head, ventrals acute, about equally long, reaching anus. Caudal convex, least height of its small peduncle about thrice in head. Colour in alcohol yellowish till pale brown, a dark brown, white-edged spot on occiput just before origin of dorsal, below it a yellow, black-edged band, much smaller than eye, crosses it till edge of preoperculum, this ocular band is also described as brown; scales on sides of body usually below lateral line with a spot of variable size, besides seven to eight vertical dark bands, the median ones the broadest and best defined, running from base of dorsal to below lower half of body; scaly sheath of dorsal and anal with a blackish margin, their border broadly hyaline; caudal likewise with a basal crescentic or longitudinally oval brown band, caudal peduncle orange. Length up to 100 mm.

Habitat: Celebes (Gulf of Boni, Strait Limbe, Sadan Isl.); Buru; Obi major; Ambon; Banda!; Solor; Timor!; Misol; New Guinea. — Philippines, Hawaiian Isls. This species seems to be rare in the Archipelago and restricted to its eastern part.

3. **Chaetodon (Tetragonoptrus) citrinellus** C.V. (Fig. 23).

Chaetodon citrinellus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 27 (apud Broussonet).
Chaetodon punctatus Cuvier & Valenciennes, l. c. p. 28.
Chaetodon citrinellus Cuvier, Règne anim. Poissons ed. ill. 1839, pl. 39, fig. 1.
Chaetodon citrinellus Bleeker, Nat. Tijdschr. Ned. Indië V, 1853, p. 501.
Chaetodon citrinellus Günther, Cat. Brit. Mus. II, 1860, p. 33.
Chaetodon citrinellus Kaup, Arch. f. Naturgesch. XXVI, 1860, p. 154.
Tetragonopterus citrinellus Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 234.
Chaetodon citrinellus Günther, Ann. Mag. Nat. Hist. (4) VIII, 1871, p. 319.

Chaetodon miliaris Günther, Brenchley's Cruise „Curaçao" 1873, p. 409. — Fische Südsee 1876, p. 47 (not figure).
Chaetodon miliaris Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877, p. 72. — Atl. ichth. IX, 1877, p. 39, Tab. 377, fig. 3 *(citrinellus)*.
Chaetodon citrinellus Macleay, Proc. Linn. Soc. N. S. Wales VIII, 1883, p. 262.
Chaetodon nigripes De Vis, Proc. Linn. Soc. N. S. Wales IX, 1885, p. 453.
Chaetodon (Tetragonoptrus) miliaris Sauvage, Poiss. Madagascar 1891, p. 259. (p. p.)
Chaetodon citrinellus Boulenger, Ann. Nat. Hist. (6) XX, 1897, p. 372.
Chaetodon citrinellus Seale, Occas. Papers Bishop Mus. I, 1901, p. 98.
Chaetodon citrinellus Jordan & Evermann, Proc. U. S. Nat. Mus. XXV, 1902, p. 357 [1]).
Chaetodon citrinellus Steindachner, Sitzb. Akad. Wien CXV, 1906, p. 1390.
Chaetodon citrinellus Jordan & Seale, Bull. Bur. Fish. XXV, (1905) 1906, p. 344.
Chaetodon citrinellus Jordan & Richardson, Bull. Bur. Fish. XXVII, (1907) 1908, p. 269.
Chaetodon citrinellus Ogilby, Mem. Queensland Mus. I, 1912, p. 54.
Chaetodon citrinellus M. Weber, Fische Siboga-Exp. 1913, p. 306.
Chaetodon citrinellus Mc Culloch, Check list Fish. N. S. Wales III, Austral. Zoolog. II, 1922, p. 91.
?*Chaetodon punctulatus* Ahl, Arch. f. Naturgesch. LXXXIX, 1913, p. 97.
Chaetodon citrinellus Ahl, l. c. p. 104.
Chaetodon citrinellus var. *semipunctatus* Ahl, ibidem.
Chaetodon citrinellus Br. *subsp. nigripes* Ahl, l. c. p. 105.
Chaetodon citrinellus Herre & Montalban, Philippine Journ. of. Sci. XXXIV, 1927, p. 68.
Chaetodon citrinellus Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 247.
Chaetodon citrinellus Fowler & Bean, Bull. U. S. Nat. Mus. vol. VIII, 1929, p. 86.
Chaetodon citrinellus nigripes Whitley, Mem. Queensland Mus. X, 1930, p. 17.

D. XIII—XIV (XV), 20—21; A. III, 16—17; L.r. 40—42; L.tr. $\frac{8-9}{16}$.

Oval, dorsal profile more elevated than ventral; height 1.8—1.9; head pointed, rostro-dorsal profile ascending in a steep, nearly straight line, 2.8—3.2 in length. Eye in middle of head, more or less than thrice in its length, in adult about equal to convex interorbital space and equal to or slightly shorter than snout, which is pointed and somewhat prominent. Cleft of mouth small, horizontal; jaws equal, with bands of small, setiform teeth. Posterior margin of preoperculum scarcely denticulate. Scales moderate, small on head, chest and median fins, arranged in

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1) The authors are right in saying: „This species is wrongly identified by Bleeker with *Chaetodon miliaris*."

lower half of trunk in horizontal in upper half in obliquely ascending longitudinal series; lateral line arched, terminating near axil of dorsal fin. Spinous dorsal about one third longer than soft, spines rather strong, heteracanth, gradually increasing in height to the middle ones which are somewhat higher and stronger than the posterior ones; soft dorsal angulated, the rays slightly increasing in height till about the sixteenth, thence abruptly diminishing in height; membrane of anterior spines deeply cleft, getting complete posteriorly. Anal of similar construction but the soft part anteriorly straight and angulate, the spines strong, especially the second which is the longest. Pectorals nearly equalling head, longer than ventrals, nearly reaching vent. Caudal convex, least height of its peduncle slightly more than diameter of eye. Colour in alcohol greyish to yellowish, darker above, whitish beneath, centre of each scale on trunk and on base of sheath of dorsal fin with a bluish round spot; a white-edged blackish-brown ocular band, smaller than eye from first dorsal spine to isthmus; the anterior straight part of angulate anal with a black margin and yellow or paler submarginal band, both getting broader anteriorly, soft dorsal

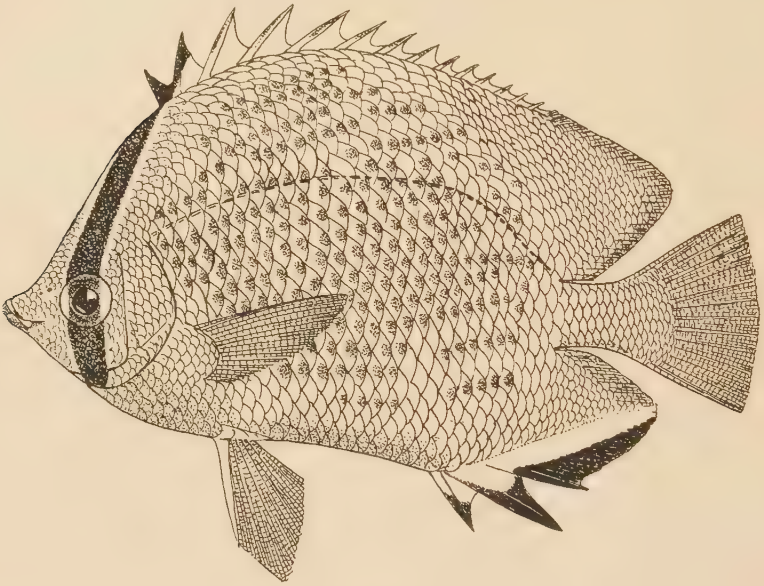

Fig. 23. *Chaetodon* (*Tetragonoptrus citrinellus*) C. V. n. s.

with a narrow white border and a black submarginal line, sometimes wanting, otherwise both fins yellowish, likewise caudal and paired fins; upper lips blackish. Length 110 mm.

Habitat: Sumatra; Pulu Weh (Sabang Bay!); Java (Patjitan, Prigi); Celebes (Menado)!; Karkaralong Isl.!; Karakelang Isl.!; Sangir Isl.; Salibabu!; Buru!; Ceram!; Ambon!; Banda!; Samau Id.!; Rotti!; Tiur Ild.!; New Guinea (Geelvink Bay!) — Philippines, Formosa, Okinawa, Australia (Queensland, N. S. Wales), Marianas, New Hebrides, Solomons, Polynesia till Hawaii.

4. **Chaetodon (Tetragonoptrus) güntheri** Ahl. (Fig. 24).

Chaetodon miliaris Günther, Proc. Zool. Soc. London 1871, p. 658. (nec Quoy & Gaimard).
Chaetodon Güntheri Ahl, Arch. f. Naturgesch. LXXXIX, 1913, p. 99.

D. XIII, 22; A. III, 19; L.r. ca. 39.

The description of Günther is as follows: „The depth of the scaly part of the body is two thirds of the total length (without caudal). Snout somewhat pointed, short, rather shorter than eye. The soft dorsal and anal fins obtusely rounded. Body of nearly olivecolour (in spirits), the scaly sheath of the dorsal fin yellow; each scale with an indistinct violet spot at the base. The ocular band commences in front of first dorsal spine, is narrower than orbit, and edged with yellow. It is still narrower below the orbit and also paler, but extends over the interoperculum. Caudal fin without any markings. The soft dorsal and anal with a narrow black and white margin, and slightly powdered with black within the margin. The smaller specimen appears to have had a round blackish spot between the seventh and thirtheenth dorsal rays close to the margin of the fin. Two specimens were sent by Dr. A. B. Meyer from Menado; the larger is 5, the smaller 4 inches long."

Ahl (l. s. c.) was right in recognizing that Günther erred in uniting the above described fish with *Ch. miliaris* Q & G. and named it therefore *Güntheri.* But as he was limited to the description of Günther he did not ventilate the question if it did not belong to *Ch. citrinellus, C.V.,* to which it is very near. Fortunately I could dispose, besides many specimens of *citrinellus,* of a fish from Ceram belonging to the Leiden Museum and of an other from Ambon belonging to the Amsterdam Museum, which seemed to correspond with Günther's fish from Celebes and have a rounded anal, with a rather broad white edge and a submarginal black band, both continued along the whole soft fin, while in *citrinellus* the anal is angulate, the anterior straight portion of which has a black marginal edge continued on the spines and a submarginal yellow or paler band, both getting broader anteriorly. The rounded dorsal fin has an outer white and an inner black line, both very narrow and usually wanting in *citrinellus*.

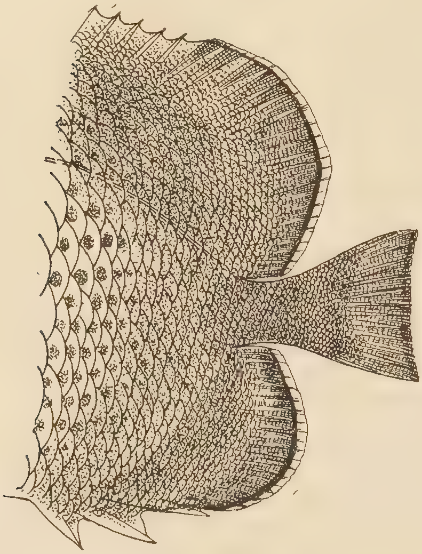

Fig. 24. *Chaetodon* (*Tetragonoptrus*) *güntheri* Ahl. n. s. Posterior part of body, to show difference from *Ch.* (*Tetr.*) *citrinellus* C. V..

Mr. F. R. Norman was so kind to examine the two specimens from Menado in the British Museum, described by Günther, and found the anal exactly as described above from the fishes from Ceram and Ambon. So this characters obviously differentiate *Ch. güntheri* Ahl from *Ch. citrinellus* C. V.

5. **Chaetodon (Tetragonoptrus) miliaris** Q. & B.

Chaetodon miliaris Quoy & Gaimard, Voyage „Uranie" et „Physicienne" 1824, p. 380.

Chaetodon miliaris Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 26.

Chaetodon miliaris Eydoux & Souleyet, Voyage „Bonite" Zool. t. I, pt. II, 1841, p. 163.

Chaetodon bellulus Thiollière, Ann. sc. phys. Soc. d'Agricult. Lyon (2) VIII, 1856, p. 443.

Chaetodon miliaris Jouan, Mém. Soc. Sc. Nat. Cherbourg (2) VIII, 1873, p. 90.

Chaetodon miliaris Günther, Cat. Brit. Mus. II, 1860, p. 31. — Fische Südsee, 1874, p. 46. (Pl. 35, fig. A?) [1]).

Chaetodon miliaris Macleay, Proc. Linn. Soc. N. S. Wales VII, 1882, p. 243.

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[1]) This figure is probably a mixture of *Ch. miliaris* and *Ch. citrinellus*.

Chaetodon miliaris Steindachner, Denkschr. Akad. Wien LXX, 1900, p. 489.
Chaetodon miliaris Fowler, Proc. Acad. Nat. Sci. Philadelphia 1900, p. 512.
Chaetodon miliaris Jenkins, Bull. U. S. Fish. Comm. XXII (1902) 1904, p. 472.
Chaetodon miliaris Jordan & Evermann, Bull. U. S. Fish. Comm. (1903) 1906, p. 371.
Chaetodon miliaris Jordan & Seale, Bull. Bur. Fish. XXV (1905) 1906, p. 344.
Chaetodon miliaris M. Weber, Fische Siboga-Exp. 1913, p. 306.
Chaetodon miliaris Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 94.
Chaetodon miliaris Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 247.
Chaetodon miliaris Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 83.

D. XIII, 22—23; A. III, 19—20; L. r. 44; L. tr. $\frac{6}{20}$.

Form and measurements about equal to *Ch. citrinellus* but arrangement of longitudinal series of scales, also in upper part of trunk more horizontal; the blue, in alcohol dark dots on centre of scales forming 10 or 11 vertical or slightly inclined series, present only in anterior third of trunk and restricted to its upper part about above a horizontal line through pectoral. Major part of caudal peduncle with a black band; soft dorsal and anal with a narrow dark margin; blackish ocular band beginning broader in its supraocular part, passing, narrower than eye, through it and ending usually much narrower above isthmus.

Our young specimen of 21 mm length agrees exactly with Fowler's description (Fish. Oceania 1928, p. 247) of four Hawaiian specimens of *miliaris* of 20—155 mm length: „Dull brownish paler below. Narrow darker line median along each row of trunk scales. Blackish-brown band from occiput to eye and across lower surface of head, though little wider than pupil; narrower below. Some examples often with brownish spot at front of breast. Blackish band across front of caudal peduncle, with short white bar on prong forward below from above and same upward from below. Lower anal edge blackish, with whitish bar adjoining submarginally. The dorsal spines constantly 13".

Habitat: Taam Isl. (near Kei Isl.) 27 m!; New Guinea (Macleay). — Polynesia, Hawaii.

Note. There is some confusion about the taxonomy and especially the synonymy of *Chaetodon miliaris* Q. G., *Ch. citrinellus* C.V. and related spotted species. When Bleeker edited in 1877 Part IX of his Atlas ichthyologique he united with *Ch. miliaris* Q. G. *Ch. citrinellus* C.V. and *Ch. guttatissimus* Bennet and said in his description of *Ch. miliaris* „mes individus présentent toutes les nuances qui ont fait faire de cette espèce les Chaetodon miliaris et citrinellus", though he adds „mais pas un seul a la queue noirâtre comme l'individu du miliaris figuré dans les „Fische der Südsee" and he likewise notifies one of the differences of *Ch. guttatissimus.* His erroneous assertion was nevertheless of influence on ichthyologists. He was f.i. implicitly followed by Sauvage (Poiss. Madagascar 1891) who even added *Ch. chrysurus* Liénard to the synonyms. According to this perception was the geographical extension of the so called *miliaris* enormous, reaching from East-Africa, Madagascar to Hawaii with a northern extension to Tonkin, Formosa and Philippines and a southern to Queensland; consequently references to *miliaris* are doubtful when not supplied with indication of the character of the fish they quote. Further errors arose from the description of *miliaris* and *citrinellus* by Günther (Fische Südsee p. 46) and the figures A and B on tabula 35, the colour pattern of which were taken from the drawings of Garret, while the fishes themselves were drawn after specimens in the British Museum. We are not sure, that there has not occurred some error. They have occasioned remarks f.i. by Jordan & Seale and induced Ahl (Arch. f. Naturgesch. 1923) to create a new species *Ch. garretti* Ahl and a variety or subspecies *Ch. citrinellus* var. *semipunctatus* Ahl. One of us (Siboga Exp. 1913 p. 306) already concluded that Bleeker erroneously united *citrinellus* with *miliaris* and that the figure in his Atlas ichthyologique (Tab. 377, fig. 3) represents *citrinellus* and not *miliaris.* We are now of opinion, that Bleeker never saw a specimen of *miliaris* from the Archipelago. This species — if present there — seems to be very rare. Günther (Proc. Zool. Soc. London 1871, p. 658) described it from Menado (Celebes), collected by A. B. Meyer, quoted again in his „Fische der Südsee" and referred to by A. B. Meyer himself in a comprehensive catalogue (Anal. Soc. Españ. de Hist. Nat. XIV, 1885, p. 17) of his collection. We have shown above (p. 79) that this fish is quite different from *miliaris* and belongs to a new species called *güntheri* by Ahl; it misses also the broad black band on base of caudal peduncle, characteristic for *miliaris.* The only specimen of *miliaris* from the Archipelago we personally know of is that above described ¹). Otherwise it seems to be restricted to Poly-

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¹) It is true that Macleay, (l. s. c. p. 243) records it from New Guinea. Though no diagnosis is added, the fact that he names a year later (Proc. Linn. Soc. N. S. Wales VIII, 1883, p. 262) also *citrinellus* from New Guinea and quotes in both cases Günther's description in Fische d. Südsee, allows

nesia till Hawaii and probably wrongly referred from Madagascar on authority of Sauvage, who confounded *Ch. chrysurus* Liénard (nec Desjardin) = *Ch. dolosus* Ahl from Mauritius with *miliaris*. This species is, f.i. by Day (Fauna Brit. India II 1889 p. 7) cited as occuring in Ceylon, Zanzibar and the Red Sea. The two first localities are relative to *Ch. guttatissimus* Bennett: a quite distinct species; in the Red Sea *miliaris* is not represented.

5. Subgenus **Chaetodontops** Bleeker.

(Bleeker, Arch. Néerl. Sc. Nat. XI, 1876, p. 305) [type: *Chaetodon collare* Bloch.] cfr. pag. 55.

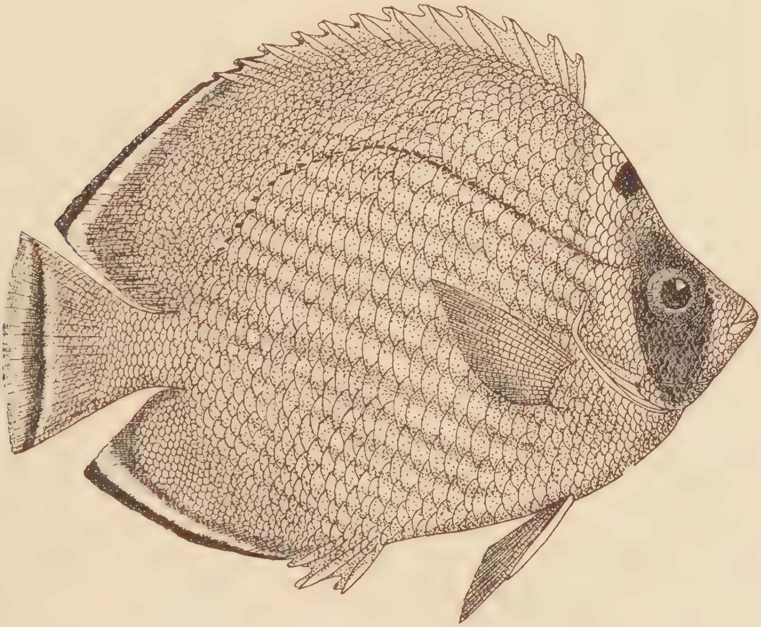

Fig. 25. *Chaetodon (Chaetodontops) bella-maris* Seale. × ¾.

1. **Chaetodon (Chaetodontops) lunula** (Lac.).

Pomacentrus lunula Lacépède, Hist. nat. Poiss. IV, 1803, pp. 507, 511, 513.
Chaetodon lunulatus Quoy & Gaimard, Voyage Uranie & Physicienne, Zoologie 1824, p. 381.
Chaetodon lunula Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 59.
Chaetodon biocellatus Cuvier & Valenciennes, loc. cit. p. 62.

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to conclude, that he disposed of two different species and that his determination of *miliaris* was correct, notwithstanding his other quotations of synonyms were wrong.

Chaetodon lunula Bennett, Proc. Zool. Soc. London 1831, pl. I, p. 61.
Chaetodon lunula Rüppell, Samml. d. Senckenb. Mus. 1852, p. 9.
Chaetodon lunula Bleeker, Nat. Tijdschr. Ned. Indië VI, 1854, p. 57. — Verh. Akad. Amsterdam II, 1855. p. 9.
Chaetodon ocellatus Bleeker, Nat. Tijdschr. Ned. Indië VI, 1854, p. 212. (nec Bloch).
Chaetodon biocellatus Bleeker, Nat. Tijdschr. Ned. Indië XI, 1856, p. 403.
Chaetodon lunula Günther, Cat. Brit. Mus. II, 1860, p. 25.
Chaetodon fasciatus Kaup, Arch. f. Naturgesch. XXVI, 1860, p. 150. (nec Forskål).
Sarathrodus lunula Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 156.
Chaetodon wiebeli Kaup, loc. cit. p. 127.
Chaetodon lunula Kaup, loc. cit. p. 129.
Tetragonopterus fasciatus Bleeker, loc. cit. p. 234. (nec Forskål).
Tetragonopterus biocellatus Bleeker, loc. cit. p. 269.
Chaetodon lunula Playfair in Playfair & Günther, Fish. Zanzibar 1866, p. 34.
Chaetodon lunulatus Jouan, Mém. Soc. Sc. Nat. Cherbourg XVII, 1873, p. 90.
Chaetodon lunula Günther, Fische Südsee, 1874, p. 42.
Tetragonoptrus biocellatus Bleeker, Poiss. Madagascar 1875, p. 95.
Tetragonoptrus lunula Bleeker, loc. cit. p. 95.
Tetragonoptrus fasciatus Bleeker, loc. cit. p. 95. (nec Forskål).
Chaetodon lunula Peters, Monatsber. Akad. Berlin 1876, p. 437.
Chaetodon biocellatus v. Martens, Preuss. Exp. Ost-Asien 1876, p. 323.
Tetragonoptrus (Chaetodontops) fasciatus Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877, Chétodont. p. 77. — Atl. ichth. IX, 1877, p. 41.
Chaetodon lunula Day, Fish. India 4°, 1878, p. 108.
Tetragonoptrus (Chaetodontops) fasciatus Bleeker, Verh. Akad. Amsterdam XVIII (1877) 1878. Poiss. Maurice p. 13, — Arch. Néerl. Sc. Nat. XIII, 1878, p. 44.
Chaetodon fasciatus Day, Fish. India 4° Suppl. 1888, p. 786. — Fish. Brit. India II, 1889, p. 8.
Chaetodon fasciatus Pellegrin, Bull. Mus. Hist. nat. IV, 1898, p. 229.
Chaetodon fasciatus, biocellatus, lunula Sauvage, Poiss. Madagascar 1891, p. 515.
Chaetodon lunula Pfeffer, Jahrb. Zool. Mus. Hamburg X, 1893, p. 8.
Chaetodon lunula Boulenger, Ann. Mag. Nat. Hist. (6) XX, 1897, p. 372.
Chaetodon lunula Seale, Occas. Papers Bishop Mus. I, 1901, p. 100.
Chaetodon fasciatus Jordan & Evermann, Proc. U. S. Nat. Mus. XXV, 1902, p. 357. (nec. Forskål).
Chaetodon lunula Jenkins, Bull. U. S. Fish. Comm. XXII (1902) 1904, p. 473.
Chaetodon lunula Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII (1903) 1905, p. 366.
Chaetodon lunula Jordan & Seale, Bull. Bur. Fish. XXV (1905) 1906, p. 340.
Chaetodon occellatus (sic) Seale, Philippine Journal Sci. V, 1910, p. 283.
Chaetodon lunula Snyder, Proc. U. S. Nat. Mus. XLII, 1912, pp. 422, 510.
Chaetodon lunula Jordan, Tanaka & Snyder, Journ. Coll. Sci. Tokyo, 1913, p. 210.
Chaetodon fasciatus M. Weber, Fische Siboga-Exp. 1913, p. 304. (nec Forskål).
Chaetodon lunula Gilchrist & Thompson, Ann. Durban Mus. I, 1917, p. 368.
Chaetodon lunula Mc Culloch, Rec. Austral. Mus. XIV, 1923, p. 4.

Chaetodon lunula Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 114.
Chaetodon lunula Barnard, Ann. S. African Mus. XXI, 1925—27, p. 610.
Chaetodon fasciatus Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 52.
Chaetodon lunula Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 248.
Chaetodon lunula Duncker & Mohr, Mitt. Zool. Mus. Hamburg, XLIV, 1929, p. 73.
Chaetodon lunula Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 96,
Chaetodon fasciatus Herre, Journ. Pan-Pacific Res. Inst. VI, 1931, pp. 7, 12. — VII, 1932, p. 4.
Chaetodon lunula Borodin, Bull. Vanderbilt Marine Mus. I, art. 3, 1932, p. 86.
Chaetodon lunula Whitley, Great Barrier Reef Exp., Fishes 1932, p. 287. (juvenis).

D. XII, 23—25; A. III, 18—20; L. r. 38—40; L. tr. $\frac{7-8}{16-17}$.

Oval, with elevated back, ventral profile less so, rostro-dorsal profile in adult concave, abruptly elevated before dorsal; height 1.4—1.7, head 2.5—3.1 in length. Eye 2.5—3.3 in head, situated in middle of length of head, slightly shorter than convex interorbital space. Snout protruding, longer than eye, lips somewhat swollen, gape of mouth horizontal; jaws nearly even, with rather broad series of setiform teeth, the mandibulary ones somewhat longer. Scales large, getting gradually smaller behind middle of trunk, much smaller on head and towards median fins; arranged on trunk in somewhat irregular slightly ascending longitudinal series; lateral line strongly arched, terminating some scales before end of dorsal. Spinous dorsal somewhat longer than soft; its spines rather strong, heteracanth, the anterior gradually increasing in height till the fourth, the following nearly subequal, the last longer than half head; anterior rays of soft anal of same height, successively increasing in height till about last third of fin whence it has an angularly rounded form; likewise the anal, which has three strong spines, the median the longest, about half length of head. Pectorals rounded, somewhat shorter than head; ventrals acute, slightly shorter, reaching vent, their spine strong, about equal to head without snout. Caudal convex, its peduncle very short and broad, its least height much less than diameter of eye. Ground colour in alcohol yellowish brown, a dark brown ocular band, much broader than eye, reaching border of preoperculum and united with its fellow on interorbital space, behind it the head is covered by a white or margaritaceous band; behind head from pectoral to about penultimate and ultimate dorsal spine a large triangular patch, from which is separated a dark small yellow band along base of anterior dorsal spine and a similar large dark brown band beginning at scapular region, continued along base of dorsal and terminating on base of caudal peduncle, broadest on both extremities; the remaining part of the trunk shows oblique brownish parallel bands running downward and forward; dorsal and anal with a black margin and a submarginal pale band; caudal with an intramarginal black band. This complicated adult colour pattern is preceded by a much simpler one in the Tholichthys stage, characterized besides by a broad ocular band, by a round white-edged black ocellus in soft anal, more conspicuous in specimens of about 60 mm length, with a dark spot on caudal peduncle, which induced to create Ch. biocellatus. Günther's plate 33 in his Südseefische gives a glimpse of this evolution. Length up to 200 mm.

Habitat: Pulu Weh (Sabang Bay!); Java (Patjitan, Karangbollong, Prigi); Bawean; Borneo; Celebes (Menado!, Tombariri, Limbe Strait); Togian Isl.; Sangir Isl.; Sumbawa; Timor!; Banda!; Ceram; Ambon!; Nusa Laut!; Buru; Halmahera; Ternate; Kei (Tual)!; Kei (Elat)!; New Guinea. — Natal, Zanzibar, Madagascar, Bourbon, Mauritius, British India, Andamans, China (Canton), Southern Japan, Formosa, Okinawa, Australia (Queensland), Marianas, Bismarck Archipelago, New Hebrides, Solomons, Polynesia, Hawaii.

Note. Following Bleeker and other authors, we united formerly *Ch. lunula* (Lac.) with Ch. *fasciatus* Forsk. as a synonym, as lately Herre & Montelban (loc. cit.) still have done in their important paper about the Philippine Butterfly Fishes. But Klunzinger, already in 1884, has shown, that *fasciatus* Forsk. is restricted to the Red Sea, while *lunula* has an enormous range, occurring on the East Coast of Africa, the region of Madagascar, along British India to China, Southern Japan, Formosa, Okinawa, Philippines, Indo-Australian Archipelago, eastwards to Polynesia till Hawaii. — *Ch. fasciatus* Forsk. differs from *lunula* (Lac.) in the dark basal dorsal band not crossing the caudal peduncle: the only character named by Fowler & Bean. But of much more importance is that after Klunzinger in *fasciatus* Forsk., the scales are much larger: the L. tr. in the region of the vent or below the sixth dorsal spine, where the L.l. is nearest to the back, has $\frac{3}{12}$ (in lunula $\frac{4-5}{15-16}$), below the first spine $\frac{6-7}{12}$ (in lunula $\frac{8-9}{14}$) and the trunk scales are very high, about thrice as high as long (in lunula about twice); L.r. has $\frac{45}{30}$ (in lunula after Bleeker $\frac{45}{40}$) scales.

2. **Chaetodon (Chaetodontops) melanotus** Bloch, Schneider.

Chaetodon melanotus Bloch, Schneider, Syst. ichth. 1801, p. 224.
Chaetodon dorsalis Rüppell, Atl. Reise Nördl. Afrika, Fische 1828, p. 41 [1]).
Chaetodon marginatus (Ehrenb.) Cuvier & Valenciennes, Hist. Nat. Poiss. VII, 1831, p. 57.
Chaetodon abhortani Cuvier & Valenciennes, l. c. p. 58.
Chaetodon dorsalis Cuvier & Valenciennes, l. c. p. 70.
?*Chaetodon melanotus* (Reinw.) Cuvier & Valenciennes, l.c. p. 71. (p.p.).
Chaetodon dorsalis Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 240.
Chaetodon Abhortani Peters, Monatsb. Akad. Berlin, 1855, p. 438.
Chaetodon melanotus Kaup, Arch. f. Naturgesch. XXVI, 1860, p. 150.
Chaetodon dorsalis Günther, Cat. Brit. Mus. II, 1860, p. 24.
Chaetodon dorsalis Kner & Steindachner, Sitz. Akad. Wien LIV, 1866, p. 361.
Chaetodon dorsalis Playfair, Fishes Zanzibar 1866, p. 34.
Chaetodon melanotus Klunzinger, Verh. Zool. Bot. Ges. Wien XX, 1870, p. 777.
Chaetodon dorsalis Günther, Brenchley's Cruise of the „Curaçao", 1873, p. 410.
Chaetodon melanotus Günther, Fische Südsee, 1873—1875, p. 44.
Tetragonoptrus (*Chaetodontops*) *melanotus* Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877, Chétodont. p. 481. — Atl. ichth. IX, 1877, p. 43. — Verh. Akad. Amsterdam XVIII, (1877) 1878, Poiss. Maurice, p. 495.
Chaetodon melanotus Day, Fish. India 4° 1878—1888, p. 108.
Chaetodon melanotus Macleay, Proc. Linn. Soc. N. S. Wales VIII, 1883, p. 262.
Chaetodon melanotus Klunzinger, Fische Roth. Meer 1884, p. 56.
Chaetodon melanotus Pfeffer, Jahrb. Hamburg. wiss. Anstalten X, 1893, p. 8.
Chaetodon melanotus Jordan & Seale, Bull. Bureau Fish. XXV (1905) 1906, p. 341.
Chaetodon melanotus M. Weber, Fische Siboga-Exp. 1913, p. 307.
Chaetodon melanotus Mc Culloch, Rec Austral. Museum XIV, 1923, p. 3.
Chaetodon melanotus Ahl. Arch. f. Naturgesch. LXXXIX, 1923, p. 128.
Chaetodon melanotus Barnard, Ann. S. African Mus. XXI, 1925—1927, p. 612.
Chaetodon melanotus Vinciguerra, Ann. Mus. Civ. Genova (3) X, 1926, p. 570.
Chaetodon melanotus Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 44.
Chaetodon melanotus Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 250.
Chaetodon melanotus Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 101.
Chaetodon melanotus Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 60. — Journ. Pan-Pacific Instit. VI, No. 4, 1931, p. 7.

D. XII, 19—20; A. III, 17—18; L.r. 35—40; L.tr. $\frac{6}{14}$.

Compressed, oval, dorsal and ventral profile nearly equally convex, rostro-frontal profile somewhat concave before eye thence gradually passing over in convexity of back; height 1.6—1.7, head

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1) Rüppell, Verzeichn. Sammlungen Senckenb. Mus. 4 Abth. Frankfurt, 1852, p. 9 cites: „*Chaetodon dorsalis* Reinw. oder *Ch. marginatus* Ehrenb.".

2.6—3.5 in length. Eye 2.6—3.5 in head, situated in its anterior half, equal to or somewhat smaller than convex interorbital space and equal to or a little shorter than conical snout. Preoperculum scarcely serrate. Anterior scales of trunk rather large nearly equal to posterior part, ascending in oblique series towards tail, diminishing in size on head and median fins; lateral line runs in a straight line towards posterior third of spinous dorsal thence curves down till below posterior third of soft dorsal. Fifth and sixth dorsal spines the highest, 1.3 in head, the three ultimate equal and as high as rounded soft dorsal, which is about as long as spinous dorsal without the four anterior spines, membrane between spines deeply incised; anal rounded, its median spine the strongest and longest, about as long as head without snout. Pectorals and ventrals of about same size, scarcely shorter than head, spine of ventrals 1.3—1.4 in head. Caudal truncate, least height of its peduncle about as long as diameter of eye. In alcohol black brown with usually an anterior larger and a posterior smaller round spot, head and lower surface greyish or whitish. Each series of scales on trunk with a median brown band, continuous or formed by separate dots; a brown, yellow edged ocular band from front to chest, narrower than eye; median fins light-brownish, with a darker submarginal narrow band; caudal with a broad transparent border, caudal peduncle at base with a dark dorsal and ventral patch, in young often completed to a broad ring. Paired fins yellow. Length up to 165 mm.

Habitat: Batu Isls.; Borneo (Serawak); Celebes (Makassar!, Menado, Tanawanko, Gulf of Tomini); Togian Isl.; Talisse Isl.; Ternate; Batjan; Halmahera!; Ceram!; Ambon!; Banda; Kei (Elat)!; Tiur Isl.!; Flores; Timor!; Goram; Misol; New-Guinea!. — Red Sea, Zanzibar, Mozambique, Madagascar, Mauritius, British India, China, Philippines, Murray Isl., Torres Strait, Bougainville, Palau, Carolines, Ralum, Polynesia, Fidji Isl.

Note: With the present species is connected a grave confusion regarding a species described by Günther (Cat. Brit. Mus. II, 1860, p. 23) as *Chaetodon reinwardti* and again and independently under the same name by Kaup (Arch. f. Naturgesch. 1863, p. 150); both proceeding from the description of Cuvier & Valenciennes (Hist. nat. Poiss. VII, 1831, p. 71) of *Chaetodon melanotus* Reinw., different from *Ch. melanotus* Bloch, Schneider and identic with *Coradion chrysozonus* (C.V.) „comme il est prouvé par une note manuscrit en ma possession ou les caractères du chrysozonus sont bien rendus" (Bleeker, Verh.

Akad. Amsterdam XVII, (1876) 1877, Chétodont. p. 39). In the same paper Bleeker says on page 83 in a note on *Ch. melanotus* Bl. Schn. „Valenciennes doit avoir confondu dans la redaction de la description du *Chaetodon melanotus* l'espèce actuelle *(Ch. melanotus* Bl. Schn.) et *le chrysozonus* K. v. H. Ce dernier est identique avec le *melanotus* Reinw. et c'est à cette espèce que se rapporte la phrase de Valenciennes „le front élevé et droit comme dans le collare". Le reste de la description va parfaitement à l'espèce actuelle, excepté seulement la formule de l'anale—3/13 qui doit manifestement être lue = 3/18. Le *Ch. Reinwardti* Kaup, synonyme du *melanotus* Val. est donc à rayer, se rapportant à une espèce double, c'est à dire, non existante." Both notes are neglected by Ahl and by Fowler & Bean. *Ch. Reinwardti Kaup* by Ahl (l.s.c.p. 132) as well as *Ch. Reinwardti* Günther by Fowler & Bean (l.s.c. p. 101) are therefore to cancel as they are fabricated after a description made after two species (*Coradion chrysozonus* and *Ch. melanotus); they* miss therefore even the value of synonyma.

We are also inclined to consider as a colour-variety of *Ch. melanotus:* Bl. Schn.:

Chaetodon ocellicauda C.V. (Hist. nat. Poiss. VII, 1831, p. 69), later described again by Kaup (Arch. f. Naturgesch. XXVI, 1860, p. 150), Günther (Cat. Brit. Mus. II, 1860, p. 29) and Ahl (Arch. f. Naturgesch. XXXIX, 1923, p. 131), and also named by Plaifair, von Martens, Schmeltz, Meyer, Elera (see Fowler and Bean l.s.c.) and lately by Duncker & Mohr (Zool. Mus. Hamburg, XLIV, 1929, p. 73). The most explicit diagnosis of Ahl contains for his specimens of *melanotus* and *ocellicauda* of the same size no significant differences other than colour markings, especially a large black white-edged spot on each side of tail. Fowler & Bean (Bull. U. S. Nat. Mus. VIII, 1929, p. 109), who give only the shortened diagnosis of *Ch. ocellicauda* after Günther say on page 103 about *melanotus:* „The young are similar to the adult in coloration, the black blotches on the caudal peduncle perhaps larger and ocellate". This agrees with the remark of Bleeker (Atl. ichth. IX, 1877, p. 44) „Les taches de la queue n'en font qu'une seule, en forme de bandelette dans les jeunes et quelque fois aussi dans les individus de l'âge avancé". This juvenile character seems therefore capable to be retained but is no reason to value *Ch. ocellicauda* higher than a colour-variety. We have a specimen of 32 mm length from the Westcoast of Sumatra, which harmonizes with Ahl's-description but differs from it by the black median dot formed by the joint ventral end of the ocular bands characteristic for *melanotus*.

3. **Chaetodon (Chaetodontops) selene** Blkr.

Chaetodon selene Bleeker, Nat. Tijdschr. Ned. Indië V, 1853, p. 76.
Chaetodon selene Günther, Cat. Brit. Muss. II, 1860, p. 30.
Tetragonopterus selene Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 286.
Chaetodon selene v. Martens, Preuss. Exp. Ost-Asien 1876, pp. 323, 388.
Tetragonoptrus (Chaetodontops) selene Bleeker, Verh. Akad. Amsterdam XVIII, (1876) 1877, Chétodont. p. 84. — Atl. ichth. IX, 1877, p. 44. — Arch. Néerl. Sc. nat. XIII, 1878, p. 45.
Chaetodon selene Boulenger, Proc. Zool. Soc. London 1887, p. 657.
Chaetodon selene Evermann & Seale, Bull. Bur. Fish. XXVI 1907, p. 96.
Chaetodon selene Zugmayer, Abh. Bayer. Akad. XXVI, 1913, p. 11.
Chaetodon selene Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 119.
Chaetodon selene Herre & Montalban, Philippine Journ. Sci. XXXIV 1927, p. 54.
Chaetodon selene Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 108.
Chaetodon selene Herre, Notes Fish. Stanford Univ. 1931, p. 60.

D. XII, 20—22; A. III, 18—19; L.r. 28—32; L.tr. $\frac{9}{14}$.

Compressed, orbicular, dorsal profile strongly elevated, rostrodorsal profile with a concavity before eye, thence ascending in a straight line; height 1.6—1.7, head 3—3.3 in length. Eye 3.4—3.5 in head, situated about in middle of head, its diameter in young little greater, in adult equal to convex interorbital space. Snout conical, prominent much longer than eye; the jaws nearly even, cleft of mouth somewhat oblique, with nearly equal series of setiform teeth. Angel of preoperculum denticulate. Scales large, arranged in obliquely ascending longitudinal series, much smaller on chest, head and toward median fins; lateral line obliquely ascending in a straight line till below about sixth to eighth dorsal spine thence descending in a straight line toward axil of dorsal fin and caudal peduncle. Spinous dorsal conspicuously longer than soft; the six anterior spines getting gradually longer and stronger, surpassing the about subequal posterior ones; soft dorsal rounded, first ray equal to last spine, median rays increasing in size; anal of similar construction, its median spine the longest and strongest, less than twice in head. Pectorals acutely rounded 1,3 in head, ventrals acute, of about equal length. Caudal slightly emarginate, least height of its peduncle more than thrice in head. Ground colour in alcohol yellowish, below lateral line pale brown lines run dorsoventrally following the oblique series of scales, above ascending part of lateral line the scales have a central white spot (in life red), serially arranged. A blackish brown ocular band, originating at first dorsal spine, much narrower than eye, passes eye on its course to isthmus; between both eyes, crossing the interorbital space, two orange (red) bands; a broad crescentlike blackish band runs along base of dorsal, passes along caudal peduncle and terminates on soft anal; both its ends are pointed; dorsal and anal with a light border and an inframarginal dark line; hind border of caudal violet, pectorals and ventrals whitish. Length 160 mm.

Habitat: Celebes (Makassar!); Solor; Ambon!; New Guinea. — Gulf of Oman, Yokohama, Philippines.

4. **Chaetodon (Chaetodontops) collare** Bloch.

Chaetodon collare Bloch, Ausl. Fische III, 1787, p. 116.
Chaetodon collare Bloch, Schneider, Syst. ichth. 1801, p. 223.
Chaetodon collare Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 53.
Chaetodon aureus Schlegel, Fauna Japon. Poiss. 1844, p. 81. (nec Bloch).
Chaetodon aureus Richardson, Reports Ichth. China and Japan, 1846, p. 246.
Chaetodon viridis Bleeker, Nat. en Geneesk. Arch. Ned. Indië (3) II, 1845, p. 520.
Chaetodon collare Bleeker, Verh. Batav. Gen. XXIII, (1849) 1850, p. 19.
Chaetodon praetextatus Cantor, Journ. Asiat. Soc. Bengal VIII, (1849) 1850, p. 1138.
?*Chaetodon unifasciatus* Gray, Cat. Fish. Gronow II, 1854, p. 69.
Chaetodon parallelus Gray, loc. cit. p. 70.
Chaetodon aureus Bleeker, Act. Soc. Sc. Indo-Neerl. III, 1858, p. 15. (nec Bloch).
Chaetodon collare Bleeker, Act. Soc. Sc. Indo-Neerl. VIII, 1860, p. 26.
Chaetodon collaris Günther, Cat. Brit. Mus. II, 1860, p. 21.
Chaetodon praetextatus Günther, loc. cit. p. 22.
Chaetodon aureus Günther, loc. cit. p. 29.
Chaetodon collaris Kaup, Ned. Tijdschr. Dierk. I, 1863, p. 126.
Chaetodon praetextatus Kaup, ibidem.
Tetragonoptrus collaris Bleeker, Ned. Tijdschr. Dierk. IV, (1871) 1872, p. 140.
Tetragonoptrus (*Chaetodontops*) *collaris* Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877, Chétodont. p. 80. — Atl. ichth. IX, 1877, p. 42.
Chaetodon collaris Günther, Proc. Zool. Soc. London 1887, p. 657.
Chaetodon collaris Day, Fish. India, 4° 1878—1888, p. 107.
Chaetodon collaris Sauvage, Poiss. Madagascar, 1891, p. 515.
Chaetodon collaris Pellegrin, Bull. Mus. Hist. Nat. IV, 1898, p. 229.
Chaetodon collaris Duncker, Mitth. Naturh. Mus. XXI, 1904, p. 151.
Chaetodon collare Ahl, Arch. f. Naturgesch. LXXXIX 1923, p. 135.
Chaetodon collare var. *praetextatus* Ahl. loc. cit. p. 136.
Chaetodon collare var. *duplicicollis* Ahl, loc. cit. p. 137.
Chaetodon collare var. *parallelus* Ahl, loc. cit. p. 138.
Chaetodon collare Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 41.
Chaetodon collare Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 104. (salve synonyma).
Chaetodon collaris Pillay, Bombay Nat. Hist. Soc. XXXIII, 1929, p. 368.

D. XII, 25—27; A. III, 20—22; L.r. ca 30; L.tr. $\frac{8}{15}$.

Nearly orbicular, rostro-frontal profile behind concave pointed snout steeply ascending in a nearly straight line to more or less prominent convexity before dorsal; height about 1.5, head 3.1—3.3 in length. Eye 3—3.6 in head, a little less than slightly convex interorbital space, somewhat prominent above eye. Snout somewhat pointed and prominent, nearly thrice in head and somewhat surpassing diameter of eye. Mouth nearly horizontal, jaws subequal, lips rather thick; teeth brushlike, conspicuous, about subequal. Preoperculum with rounded angel, scarcely denticulate. Scales on trunk large, in strongly ascending longitudinal series, diminishing in size posteriorly and getting very small on head, chest and median fins; lateral line running in a straight line toward second third of spinous dorsal, thence curved toward termination of dorsal. Spinous dorsal about as long as soft, spines strong, the middle ones the longest, especially the fifth and sixth, about as long as head without snout, last spine lower than soft dorsal, the middle rays of which are longest; it has a rounded contour toward base of caudal peduncle. Anal of similar form, its second and third spine subequal, slightly shorter than longest dorsal spine. Acute pectorals nearly 1.5 in head. Caudal nearly truncate, least height of its peduncle somewhat more than diameter of eye. Colour in alcohol olive brown, with more or less conspicuous stripes following the obliquely ascending series of trunk scales, entering dorsal; scales on body with a paler centre; on head a blackish brown band from front to chest, passing through eye, about as broad as eye, with a rather broad white hindborder, meeting its fellow as a narrow stripe on nape and as a broad, at least broader band on chest; a narrow white frontborder from eye to isthmus or also continued above eye; snout blackish with a white chin, a white spot on corner of mouth and below it. Caudal with broad whitish margin and a dark carmine crossband, getting paler near base; border of soft dorsal black with a white dark-margined intramarginal band, soft anal white-margined; ventrals blackish. Length 160 mm.

Nom. indig. Kipa or Kèpè-Kèpè Tikar (Malay, Batavia).

Habitat: Sea of Pinang; Pulu Weh (Sabang Bay!); Sumatra (Kauer); Nias; Java (Bay of Batavia!); Celebes (Menado); Ambon!. — Madagascar (Sauvage), Muscat, British India, Philippines, Marianas, Saypan, Guam.

Note. *Chaetodon auripes* Jordan & Snyder (Check list Chaetodont. 1900, p. 90 substitute for *Ch. aureus* Schlegel nec Bloch) = *Ch. collaris* Jordan & Fowler (Proc. U. S. Nat. Mus. XXV, 1902, p. 534) differs from *collare* Bloch besides in the colour pattern in the size and arrangement of the trunk scales and in the lateral line which is evenly arched. We take it therefore for a different species proper to Southern Japan. *Ch. collare* Bloch seems to be restricted to Madagascar, the coast of Arabia, British India, the Indo-Australian Archipelago, the Philippines and some Melanesian Islands. That it should also occur in Paumotu Isl. depends on a indication of Günther who confounded it with *Ch. reticularis* C.V.

5. **Chaetodon (Chaetodontops) bella-maris** Seale. (Fig. 25).

Chaetodon bella-maris Seale, Philippine Journ. Sc. IX, 1914, p. 72.
Chaetodon bella-maris Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 113.
Chaetodon collare var. *Kneri* Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 137.
Chaetodon bella-maris Herre & Montalban, Philippine Journ. Sc. XXXIV, 1927, p. 49.
Chaetodon bella-maris Chevey, Invent. Faune Indochine 19e note, 1932, p. 24.

D. XII, 23—26; A. III 18—21; Lr. 34—35; L.tr. $\frac{7}{13}$.

Compressed, subrhombic-rounded, back much elevated, rostrodorsal profile concave above snout, thence ascending in a somewhat convex line to dorsal. Height 1.6 in length, head 1.2, short, about as long as high. Eye 3.2—3.5 in head, situated nearly totally in its anterior half, about equal to blunt, not much produced snout with rather thick lips. Interorbital space saddle-like with a slight protuberance dorsally, somewhat broader than diameter of eye. Angel of preoperculum rounded and scarcely indentated. Scales large, on trunk arranged in regular oblique series, on head and median fins much smaller; lateral line runs in a straight line nearly to base of posterior dorsal spines thence slightly curved downward nearly to termination of dorsal. Spinous dorsal about equally long as soft; spines strong, heteracanth, evenly graduated to the last, sixth, seventh and eighth the strongest, nearly 2.6 in head, membrane deeply incised; soft dorsal and anal strongly rounded, median rays much longer than dorsal spines; second and third anal spines the longest about thrice in head. Pectorals acute, much longer than head without snout, ventrals shorter, the first prolonged ray reaching vent, spine twice in head. Caudal slightly rounded, least height of its short peduncle nearly 2.8 in head. Colour in alcohol uniform greyish or yellowish, a blackish ocular band beginning as a broad patch, narrowely united with its fellow on front or separated from it, as broad as eye or somewhat broader while passing through it and terminating, somewhat narrowing, at base of branchial opening, not continued on chest; behind ocular band a dorsally curved rather broad white band, behind it on nape a rather small or usually an angulate broad black patch continued as a narrow stripe behind upper part of operculum, upper lip black, above it a rhombic white or grey patch on interorbital; interspinous dorsal membrane with black tips, soft dorsal and anal with a black margin and a submarginal white band, caudal with a broad elliptic black intra-marginal band, trunk with more or less conspicuous dark bands following the oblique series of scales. Length 160 mm.

Habitat: Java (Bay of Batavia)!; Borneo (Balikpapan)!. Philippines, Formosa, Annam, China (Takoo, Kanton, Hongkong).

Note. The more or less convex outline of the rostro-dorsal profile combined with a smaller or larger and angulate black patch on the nape are perhaps sexual differences.

11. **Anisochaetodon** Klunzinger.

Klunzinger, Fische d. Rothen Meeres, 1884, p. 54) [type *Chaetodon auriga* C. V.].

Compressed, rhomboidal or orbicular; covered by two kinds of ciliated scales: large rhombic ones, at least in anterior part of trunk, their free border with unequal sides forming an obtuse angel (Fig. 28), and much smaller regularly rounded ones elsewhere. The longitudinal rows of the large ones less distinct, the transverse rows very pronounced. Linea recta 45 or less. Lateral line arched, terminating before or near end of soft dorsal. Snout obtuse or pointed, more or less produced, usually equal to or surpassing diameter of eye. Mouth small with setiform teeth in brush-like bands in jaws. Preoperculum entire, usually more or less weakly denticulate. Spinous dorsal less than one and a half times longer than soft dorsal; dorsal spines XII—XIII (by exception XI—XIV), none prolonged, usually the middle ones the highest, and 22—25 rays forming an usually bluntly rounded fin. Anal III with 17—22 rays, forming an obtuse fin. Other characters equal to Chaetodon.

Distribution: Marine littoral fishes of small or moderate size, inhabiting tropical or subtropical seas, frequenting rocky coasts, especially coral reefs.

Key to the indo-australian subgenera and species of *Anisochaetodon.*

1. Large rhombic or irregularly rounded scales in anterior part of trunk above pectorals, likewise above anterior part of lateral line; scales in posterior part much smaller, regularly rounded and arranged in horizontal rows. Orbicular; rostro-dorsal profile steeply convex with undeep concavity before eye. L. l. regularly arched. Lower border of eye about level with commencement of gape of mouth. Preoperculum nearly entire. D. XI—XIII, 22—23, A. III, 18—20; L.r. 30—40.

1. Subgenus **Lepidochaetodon** Blkr.

A. Black ocular band from nape to chest, meeting its fellow above and below. D. XIII.
  a. Snout bluntly rounded, little longer than eye. L. r. about 40. Black, white-edged ocellus below ultimate dorsal spines, rows of median scales with vertical dark lines. . . . . 1. *unimaculatus* p. 97.
  b. Snout bluntly pointed, shorter than eye. L. r. about 30. Dark band from anterior dorsal spines to ventral, posterior part of body and caudal peduncle darker. . . . . 2. *kleini* p. 99.
B. Ocular band from nape to suboperculum; D. XI; only few enlarged scales round pectorals. Body crossed by two transverse, somewhat curved dark-brown bands much broader than ocular band and inferiorly with about ten horizontal, superiorly with about twelve oblique dark lines, following the series of scales . . . . 3. *trivirgatus* p. 101.

2. Large rhombic scales in major part of trunk, much smaller and regularly rounded ones in posterior part of trunk, likewise above L.l. and on breast, nape and tail, minute on head and median fins; rhombic scales not forming longitudinal but distinct transverse rows. More or less orbicular; rostro-dorsal profile concave till above eye thence with slight convexity steeply ascending. Snout straight, produced, pointed, longer than eye. L.l. strongly angulate or moderately arched. Preoperculum weakly denticulate. D. XIII, 22—25; A. III, 16—22; L.r. 29—35.

2. Subgenus **Linophora** (Kaup) Blkr.

A. Ocular band from occiput to isthmus or suboperculum.
  a. Fifth and sixth dorsal ray setiform produced.

L. l. angularly arched. Commencement of gape of mouth below level of lower border of eye. Anterior part of trunk with about five dark obliquely ascending bars, the last meeting similar but opposite descending ones, soft dorsal with black ocellus. . . . . . 1. *auriga* p. 103.

b. No produced dorsal rays.

α. L. l. strongly and somewhat angularly arched. Commencement of gape of mouth above level of lower border of eye. Six dark oblique lines from operculum to dorsal, the last meeting opposite ones directed obliquely downwards; a semilunar blotch from spinous dorsal across soft dorsal and caudal peduncle to anal. D. usually XIII. . . . . 2. *vagabundus* p. 107.

β. L.l. highly arched. Commencement of gape of mouth below lower border of eye. Sides of body checkered by oblique angularly crossing dark streaks; a large dark round patch below anterior part of dorsal (easily fading). Ocular band terminating on suboperculum D. XIII . . . . 3. *rafflesi* p. 110.

B. Ocular band short, from front to suboperculum, above it a horse-shoe shaped patch. L. l. moderately arched. Commencement of gape of mouth below level of lower border of eye. Trunk scales with dusky border giving a checkered appearance. D. XIII . . . . 4. *chrysurus* p. 112.

3. Large rhombic scales on whole trunk above and below L.l., smaller rounded ones on tail, breast and head, minute on median fins. Orbicular to oval; rostro-dorsal profile above eye steeply ascending in a straight or slightly convex line. Snout conical, horizontally produced, about twice longer than eye; D. XII, 24—27; A. III, 20—22; L.r. 20—25. Dorsal spines graduated till sixth or seventh spine.

3. Subgenus **Oxychaetodon** Blkr.

a. Nearly oval. L.l. ascending straight to first third of soft dorsal thence curving down to its termination. Commencement of gape of mouth above level of lower border of eye. Ocular band from occiput to isthmus, where it is united with its fellow, on front above eye interrupted. Crescent-shaped brown patch from ultimate dorsal spines across soft dorsal to anal; trunk with about 20 dark lines following vertical rows of scales. . . . . 1. *lineolatus* p. 114.

b. Orbicular. L. l. regularly arched. Commencement of gape of mouth somewhat below or level with lower border of eye. Ocular band not interrupted from front to isthmus, where it is united with its fellow. Trunk with two triangular patches, one from about the four anterior dorsal spines to below L. l.; the second from frontal part of soft dorsal to below L. l. . . . 2. *falcula* p. 116.

I. Subgenus **Lepidochaetodon** Bleeker.

(Bleeker, Arch. Neérl. Sc. Nat. XI, 1876, p. 306) [type: *Chaetodon unimaculatus* Bloch.] cfr. page 95.

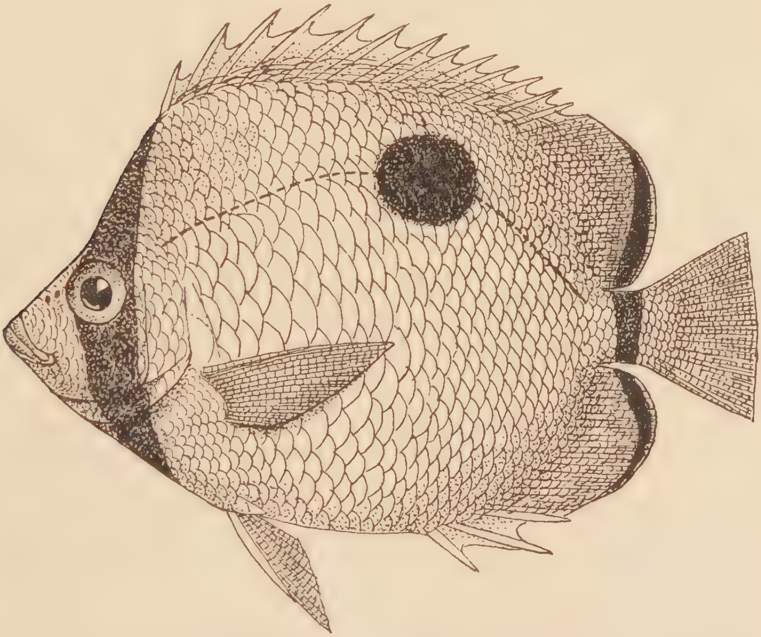

Fig. 26. *Anisochaetodon* (*Lepidochaetodon*) *unimaculatus* (Bloch). n. s.

I. **Anisochaetodon (Lepidochaeton) unimaculatus** (Bloch).
(Fig. 26).

Chaetodon unimaculatus Bloch, Ausl. Fische III, 1787, p. 75.
Chaetodon unimaculatus Bloch, Schneider, Syst. ichth. 1801, p. 221.
Chaetodon unimaculatus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 72.

Chaetodon unimaculatus Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 241.

Chaetodon unimaculatus Rüppell, Samml. Senckenberg, Mus. 1852, p. 9.

Chaetodon cordiformis Thiollière, Fauna Woodlark 1857, p. 165.

Chaetodon cordiformis Montrouzier, Ann. Sc. phys. Soc. d'Agricult. Lyon (2) VIII, 1857, p. 443.

Chaetodon unimaculatus Günther, Cat. Brit. Mus. II, 1860, p. 11.

Citharoedus unimaculatus Kaup, Arch. f. Naturg. XXVI, 1860, p. 145.

Tetragonopterus unimaculatus Bleeker, Ned. Tijdschr. Dier. I, 1863, p. 234.

Chaetodon unimaculatus Guichenot, Mém. Soc. Sc. Nat. Cherbourg, XII, 1866, p. 145.

Chaetodon unimaculatus Playfair in Playfair & Günther, Fish. Zanzibar 1866, p. 32.

Chaetodon unimaculatus Günther, Fische Südsee 1873—1875, p. 37.

Chaetodon unimaculatus Peters, Monatsber. Akad. Berlin 1876, p. 437.

Tetragonoptrus (*Lepidochaeton*) *unimaculatus* Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877. Rév. Chétodont. p. 87. — Atl. ichth. 1877, p. 45. — Arch. Néerl. Sc. Nat. XIII, 1878, p. 45.

Chaetodon unimaculatus Day, Fish. India 4° 1878—1888, p. 107.

Chaetodon unimaculatus Macleay, Proc. Linn. Soc. N. S. Wales VII, 1882, p. 241.

Chaetodon sphenospilus Jenkins, Bull. U. S. Fish. Comm. XIX (1899) 1901, p. 395.

Chaetodon unimaculatus Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII, (1903) 1905, p. 368.

Chaetodon unimaculatus Steindachner, Sitz. Akad. Wien CXV, 1906, p. 1390.

Chaetodon unimaculatus Jordan & Seale, Bull. Bur. Fish. XXV, 1905 (1906) p. 342.

Chaetodon unimaculatus Ahl, Arch. f. Naturg. LXXXIX, 1923, p. 140.

Chaetodon unimaculatus subsp. sphenospilus Ahl, loc. cit. p. 141.

Chaetodon unimaculatus subsp. interruptus Ahl, loc. cit. p. 142.

Chaetodon unimaculatus Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 61.

Chaetodon unimaculatus Fowler, Fish. Oceania, Bishop Mus. X, 1929, p. 251.

Chaetodon unimaculatus Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 110.

Chaetodon unimaculatus Herre, Journ. Pan-Pacific Res. Inst. VI, 1931, p. 12; VII 1932, p. 4.

Chaetodon unimaculatus Borodin, Bull. Vanderbilt Mar. Mus. I, 1932, p. 86.

Chaetodon unimaculatus Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 60.

D. XIII, 22—23; A. III, 19—20; L.r. ca 40; L.tr. $\frac{8}{19}$

Compressed, orbicular, dorsal outline strongly elevated and more convex than ventral; rostro-dorsal profile with an undeep concavity before eye thence steeply and somewhat convexly ascending till dorsal; height about 1.5, head 3.1—3.6 in length. Eye about midway in head, situated above horizontal through mouth, 3—3.8 in head, about equal to broad, convex interorbital space and slightly shorter than bluntly rounded snout with rather small, nearly horizontal mouth. Preoperculum nearly entire. Scales in anterior third of trunk between pectoral and dorsal large, rounded, the other trunkscales conspicuously smaller, diminishing in size towards tail, on head, chest and on median fins arranged in irregular longitudinal series; lateral line moderately arched, reaches near end of dorsal. Spinous dorsal about the distance of the three or four anterior spines longer than soft rounded dorsal, spines strong, the middle ones in adult somewhat higher than the posterior ones, about twice in head; anal bluntly rounded, third spine about 1.4 in head. Pectorals and ventrals subequal, slightly acute, equalling head or somewhat shorter; caudal nearly truncate, least height of its short peduncle 9 to 9.5 in length. Ground colour in alcohol yellowish; a blackish ocular band, about as wide as eye while crossing it, runs from nape and front towards chest till near origin of ventral, meeting its fellow above and below; a similar slightly narrower white-edged band runs along margin of soft dorsal and anal, crossing caudal peduncle, pointed above and below; a white-edged black ocellus, much larger than eye, crossed by lateral line 1), on back below the five ultimate dorsal spines. Rows of median scales usually with vertical dark lines. Length 150 mm.

Habitat: Java; Sumatra; Solor; Timor!; Celebes (Makassar!); Buru; Ambon!; Ceram! Banda; New Guinea. — Zanzibar, Madagascar, Mauritius, Ceylon, Philippines, Woodlark, New Caledonia, New Hebrides, Bonham, Samoa Isl., Society Isl., Hawaii Isl.

2. **Anisochaetodon (Lepidochaetodon) kleini** (Bloch).

Chaetodon kleinii Bloch, Ausl. Fische IV, 1790, p. 7.
Chaetodon melastomus Bloch, Schneider, Syst. ichth. 1801, p. 224.
Chaetodon melammystax Bloch, Schneider, loc. cit. p. 224.
Chaetodon kleinii Bloch, Schneider, loc. cit. p. 225.
Chaetodon kleinii Lacépède, Hist. nat. Poiss. IV, 1802, pp. 461, 495.
Chaetodon virescens Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 30.
Chaetodon Kleinii Cuvier & Valenciennes, ibidem.
Chaetodon flavescens Bennett, Proc. Zool. Soc. London 1831, p. 61.
Chaetodon virescens Bleeker, Verh. Batav. Gen. XXIII (1849) 1850, Chaetodont. p. 17.
Chaetodon kleinii Bleeker, Nat. Tijdschr. Ned. Indië III, 1852, p. 236.
Chaetodon virescens Peters, Monatsber. Akad. Berlin 1855, p. 438.
Chaetodon kleinii Günther, Cat. Brit. Mus. II, 1860, p. 22.
Chaetodon melastomus Kaup, Arch. f. Naturgesch. XXVI, 1860, p. 144.
Chaetodon virescens Guichenot, Notes I, Réunion II, 1862, p. 25.
Tetragonopterus melastomus Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 234.

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1) In Day's specimen from Ceylon the ocellus lay above lateral line.

Chaetodon kleini, virescens, flavescens, melastomus Kaup, loc. cit. p. 128.
Chaetodon kleinii Playfair in Playfair & Günther, Fish. Zanzibar 1866, p. 33.
Tetragonopterus kleini Bleeker, Versl. Akad. Amsterdam (2) II, (1867) 1868, p. 287.
Tetragonoptrus kleini Bleeker, Ned. Tijdschr. Dierk. IV, (1871) 1872, p. 140.
Chaetodon kleinii Günther, Brenchley's Cruise „Curaçao" 1873, pp. 409. 410.
Chaetodon kleinii Peters, Monatsber. Akad. Berlin, 1876, p. 437.
Chaetodon kleinii Peters loc. cit. p. 832.
Tetragonoptrus (Lepidochaeton) kleini Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877, Rév. Chétodont. p. 88. — Atl. ichth. IX, 1877, p. 45.
Chaetodon kleinii Macleay, Proc. Linn Soc. N. S. Wales VII, 1882, p. 242.
Chaetodon kleinii Meyer, Ann. Soc. Españ. Hist. nat. XIV, 1885, p. 17.
Chaetodon kleinii Day, Fish. India 4° 1878—1888, p. 106. — Fish. Brit. India II, 1889, p. 6.
Chaetodon (Tetragonoptrus) kleinii Sauvage, Poiss. Madagascar 1891, p. 258.
Chaetodon kleinii M. Weber, in Semon Zool. Forschungsreisen V, 1895, p. 264.
Chaetodon kleini Steindachner, Abh. Senckenberg. Nat. Ges. XXV, 1900, p. 420.
Chaetodon kleini Jordan & Seale, Bull. Bur. Fish. XXV (1905) 1906, p. 342. — loc. cit. XXVI (1906) 1907, p. 34.
Chaetodon kleinii Kendall & Goldsborough, Mem. Mus. Comp. Zool. Harvard XXVI, 1911, p. 307.
Chaetodon kleinii M. Weber, Fische Siboga-Exp. 1913, p. 305.
Chaetodon kleini Gilchrist & Thompson, Ann. Durban Mus. I, 1917, p. 368.
Chaetodon kleini Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 144.
Chaetodon kleini Barnard, Ann. S. Africa Mus. XXI, 1925—1927, p. 614.
Chaetodon kleini Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 58.
Chaetodon kleini Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 251.
Chaetodon kleinii Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 113.
Chaetodon kleini Duncker & Mohr, Mitt. Zool. Mus. Hamburg XLIV, 1929, p. 27.
Chaetodon kleini Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 60.

D. XIII[1]), 22—23; A. III, 18—19; L.r. ca 30; L.tr. $\frac{7-8}{12-13}$.

Compressed, orbicular, dorsal profile more convex than ventral, rostro-dorsal profile steeply convex, slightly concave above eye, height 1.4—1.6, head 3—3.5 in length. Eye 3 to slightly more than 3.5, closer to tip of snout than to opercular border, its lower margin touching horizontal through gape of mouth, about equal to broadly convex interorbital space; in adult slightly greater than obtuse, bluntly pointed snout; mouth very small, its gape horizontal, jaws equal. Preoperculum entire or scarcely dentate. Scales rounded, in anterior half of trunk rhombic, about twice larger than posteriorly, much smaller on head, chest and median fins, along base of third to about eight dorsal spine very large and

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1) The dorsal spines rarely number XII or XIV.

rhombic, series below lateral line slightly curved downward; lateral line arched till about below end of spinous dorsal, thence oblique till end of dorsal. Spinous dorsal in young equal to, in adult about four spines longer than soft; spines strong, increasing in height till fifth or sixth, which equal head without snout, the following spines subequal, soft dorsal a little higher, evenly rounded; anal likewise, its third spine the longest, 1.2—1.3 in head. Pectorals as long as head, ventrals somewhat shorter, not reaching vent, their spine about 1.3 in head. Caudal truncate, least height of its peduncle scarcely more than diameter of eye. Ground colour in alcohol yellowish or grayish with a brown transverse band from anterior dorsal spines to ventral; posterior part of body, beginning at anal, brownish, at least darker but easily fading in alcohol, the scales may here show a dark (in life red) spot, usually easily fading but sometimes preserved and imitating indistinct lines following the series of scales; a blackish ocular band, about as broad as eye from nape to chest, it joins its fellow above and below and reaches to base of ventrals; lips and end of snout dusky; ventrals blackish, soft dorsal and anal with hyaline margin and intramarginal narrow blackish line; caudal dusky with broad pale margin. Young specimens below four cm. length have a nearly complete white-edged brown ocellus in soft dorsal near border between fourth and nineteenth ray; their second dorsal spine is also by far the longest, the following spines decreasing in height posteriorly; this proportion changes gradually with growth. Length 125 mm.

Habitat: Sabang Bay!; Sumatra (Kotaradja)!; Java-Sea!; Java (Batavia!); Strait Bali!; Postillon Isls.; Flores!; Solor!; Timor!; Celebes (Makassar!, Menado); Sangir Isl.; Karakelang Isl.!; Ambon!; Nusa Laut!; Banda!; Ceram!; Halmaheira; Ternate; Batjan; Buru!; Binongka!; Goram Arch.; Tiur!; Aru (Dobo)!; Misol; Kisser!; New Guinea. — Zanzibar, Mikindani, Mozambique, Natal, Madagascar, Bourbon, Réunion, India, China, Philippines, Queensland, Bismarck Arch., Solomons, Carolines, Marshall Isl.. — This species is one of the commonest in the Archipelago, less so in the Java-Sea.

3. **Anisochaetodon (Lepidochaeton) trivirgatus** n. sp. (Fig. 27).

D. XI, 22; A. III, 18; L.r. ca 37; L.tr. $\frac{10}{14}$.

Subrhombic, strongly compressed posteriorly, rostro-dorsal line slightly concave before eye, thence obliquely rising with a slight convexity to dorsal, hinder half of body elevated, lower profile strongly convex from snout to ventrals, less so behind ventrals. Height 1.5; head 3.13 in length. Eye thrice in head, slightly more than somewhat swollen and not much convex interorbital space, nearly equal to conical, somewhat prominent snout. Lower border of eye situated below horizontal through commencement of gape of mouth, which is oblique and anteriorly armed with rather long teeth. Two rounded approximate nostrils before eye, the anterior with a valve. The six anterior dorsal spines rather strong with deeply incised membrane, the three anterior rapidly gaining in height, the three sequent of about equal size, being the strongest and highest, not much less than length of head, the posterior five gradually diminishing somewhat in height, the last slightly lower than first dorsal ray and about as long as head without snout; soft dorsal and anal angulate posteriorly; anal spines strong, the second somewhat the longest, not much less than fifth dorsal spine. Pectorals shorter than head; ventrals about equally long, their spine about as long as head without snout, nearly reaching anus. Caudal somewhat convex, least height of caudal peduncle longer than eye. Scales of two kinds, a few irregularly rounded large ones

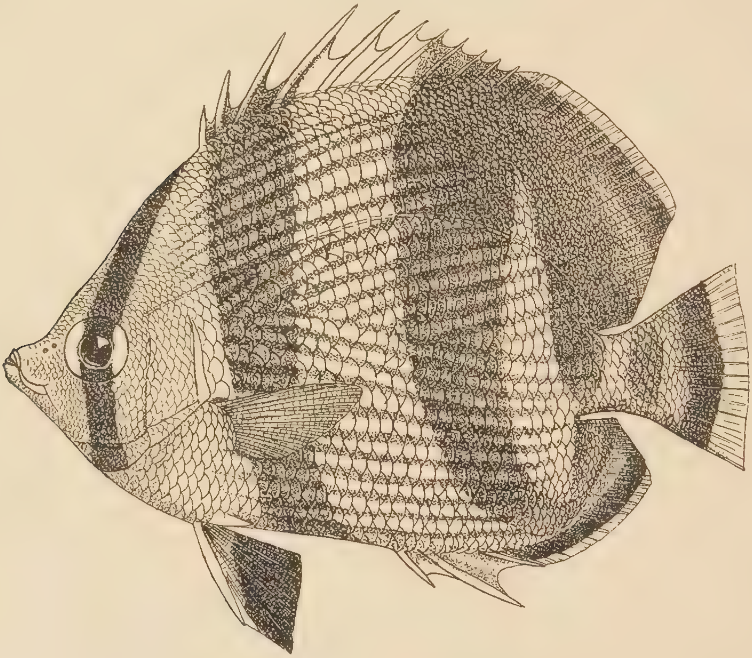

Fig. 27. *Anisochaetodon* (*Lepidochaetodon*) *trivirgatus* n. sp. n. s.

irregularly spread in the neighborhood of the pectorals above and below them; the others regularly rounded, much smaller on head, on posterior part of body, on fins and tail, otherwise larger, in regular horizontal series on inferior part of body, on superior in regular upward directed curved series; lateral line arched nearly concurrent with profile of back, terminating at end of dorsal. Grayish yellow, head and chest more silvery, a darkbrown ocular band, narrower than eye, united with its fellow somewhat before dorsal, curved down to suboperculum, narrowed to size of pupil while passing the eye; a somewhat curved band of similar colour as the ocular but more than twice broader, originates on the base of the second to fourth dorsal spines and terminates somewhat before the anus; a still broader similar band occupying the four last dorsal spines curves down in a narrowed breadth to middle of anal; its most dorsal part is narrowly connected with a darkbrown patch on soft dorsal which runs along its base to upper half of caudal peduncle, soft dorsal and anal with a broad dark, white-margined border, caudal with a similar border, sides of body inferiorly with about ten horizontal, superiorly with about 14 obliquely ascending narrow dark lines following the series of scales; the last getting posteriorly gradually shorter; pectorals light brownish, ventrals interiorly blackish. Length 109.

Habitat: The single specimen known from Ambon!, collected by van der Hugt.

2. Subgenus **Linophora** Kaup.

(Kaup. Arch. f. Naturgesch. XXVI, 1860, p. 137. Emendavit Bleeker, Arch. Neérl. Sc. Nat. XI, 1876, p. 306.). [type: *Chaetodon auriga* Forsk.] cfr. page 95.

1. **Anisochaetodon (Linophora) auriga** (Forsk.).

Chaetodon auriga Forskål, Descriptio animal, 1775, pp. XII, 60.
Chaetodon setifer Bloch, Ausl. Fische IX, 1795, p. 100.
Chaetodon setifer Bloch, Schneider, Syst. ichth. 1801, p. 225.
Chaetodon auriga Bloch, Schneider, loc. cit. p. 226.
Chaetodon auriga Lacépède, Hist. nat. Poiss. IV, 1802, pp. 457, 484.
Pomacentrus filamentosus Lacépède, loc. cit. p. 511.
Chaetodon setifer Lesson, Voyage Coquille, Poiss. II, 1830, p. 175.
Chaetodon sebanus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 74.
Chaetodon setifer Cuvier & Valenciennes, loc. cit. p. 76.
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Chaetodon auriga Bleeker, loc. cit. p. 40. — Nat. Tijdschr. Ned. Indië V, 1853, p. 164.

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Chaetodon auriga Klunzinger, Verh. Zool. Bot. Ges. Wien XX, 1870, p. 775.
Chaetodon setifer Klunzinger, loc. cit. p. 776. (var.).
Chaetodon sebanus Klunzinger, loc. cit. p. 776. (juv.).
Chaetodon setifer Günther, Fische Südsee, 1873—1875, p. 36.
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Tetragonoptrus (Linophora) auriga Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877, Révis. Chétodont. p. 92. — Atl. ichth. IX, 1877, p. 47. — Arch. Neérl. sc. nat. XIII, 1878, p. 45.
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Chaetodon setifer Macleay, Descr. Cat. Austral. Fish. I, 1881, p. 89.
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Chaetodon auriga Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 147.
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Chaetodon setifer Duncker & Mohr, Mitt. Zool. Mus. Hamburg XLIV, 1929, p. 73.
Chaetodon setifer var. *hawaiiensis* Borodin, Bull. VanderBilt Mar. Mus. I, art 2, 1930, p. 55.
Chaetodon auriga Herre, Notes Fish. Zool. Mus. Stanford. Univ. 1931, p. 59.
Chaetodon setifer Borodin, Bull. VanderBilt Mar. Mus. I, art. 3, 1932, p. 86.
Chaetodon auriga Chevey, Invent. Faune ichth. Indochine 19. note 1932, p. 24.
Chaetodon auriga Herre, Journ. Pan-Pacific Res. Inst. VI, 1931, pp. 7, 10, 12; VII, 1932, p. 4.

D. XIII, 23—24; A. III, 20—21; L.r. ca 30; L.tr. $\frac{6-8}{15-17}$.

Orbicular, strongly compressed, rostro-dorsal profile concave till above eye, thence ascending in a nearly straight line to dorsal; height 1.6 to nearly twice, head 2.5—3 in length. Eye in middle of length of head, 3 to nearly 4 in that length, a little greater to about equal to convex interorbital space, shorter, to one third shorter than pointed, straight, prominent snout which goes 2,3—2,6 in head. Jaws equal, gape of mouth rather small, about horizontal; teeth conspicuous, laterally reaching behind gape. Preoperculum rounded, finely serrated. Scales on sides below lateral line in regular very oblique series, large, rhombic, those above lateral line somewhat smaller, rounded; much smaller on head, chest, caudal peduncle and median fins; lateral line strongly and somewhat angularly arched, terminating near last dorsal ray. Spinous dorsal about one third longer than soft; its spines increase in height posteriorly, the first goes nearly thrice, the last 1.6 in head. Fifth or sixth dorsal ray in adult produced into a filiform thread, increasing in length with age and wanting in young specimens; the following part of the rayed dorsal rounded; anal somewhat pointedly rounded; the spines strong, second and third subequal 1.5 to 1.8 in length of head. Pectorals shorter than head, ventrals angulate, about 1.8 in head. Caudal broadly convex, least height of its peduncle more than diameter of eye. In alcohol almost uniformly yellowish, lighter below, more grayish above, anterior part of back with about five oblique dark bars ascending towards spinous dorsal and continued by much shorter ones along soft dorsal, they are met at right angles by ten similar bars, ascending parallel from belly and anal upwards; a black ocular band running from front to isthmus, narrower than eye above it, much wider below it; dorsal filament and border of soft dorsal with a black margin, inward with a more or less developed oval black patch (setifer) usually wanting in specimens from Red Sea. Blackish intramarginal lines on caudal. Length 180 mm.

Habitat. Pulu Weh (Sabang Bay!); Sumatra (Kauer); Java (Patjitan, Karangbollong, Prigi); Cocos Isl.; Bawean; Flores (Isl. Serbet!); Solor!; Timor (Kupang, Atapupu); Rotti!; Celebes (Makassar!, Menado, Tanawanko); Saleyer!; Salibabu!; Sangir; Halmaheira!; Ternate; Buru; Ambon!; Ceram!; Batjan; Banda!; Kisser!; Kei (Tual)!; Aru Isl.!; New Guinea!. — Red Sea, Zanzibar, Mozambique, Coast of Natal, Bourbon, Mauritius, Seychelles, British India, Ceylon, Nicobares, Annam, China, Japan, Riu Kiu Isl., Philippines, Australia (Sidney, Port Jackson, New South Wales), Melanesia, Micronesia, Polynesia.

Note: One of us has shown (Siboga-Expd. p. 363) that in an example of 60 mm. length, the setiform prolongation of the fifth dorsal ray is still wanting and begins to appear in one of 107 mm. therefore corresponding with *Ch. sebanus* C. & V. In opposition to Bleeker's record our specimen of 23 mm. length shows still the praeopercular and scapular bone-plates of the *Tholichthys*-stage but at the same time the conspicuous indication of the colour pattern of the adult, which seems not to differ, racially as some authors still pretend, in the Red Sea specimens (*auriga*) and in the indo-pacific *setifer*. They have overlooked that Klunzinger (Fische Roth. Meer, p. 56) explains, that the round black spot in the soft dorsal of *setifer* usually is wanting in the Red Sea specimens, but that he finds it in some of his full grown examples with prolonged dorsal ray, as also in those of Ehrenberg.

2. **Anisochaetodon (Linophora) vagabundus** (L.).

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Chaetodon pictus Forskål, Descr. Anim. 1775, pp. XIII, 65.
Chaetodon vagabundus Bloch, Ausl. Fische III, 1787, p. 88. IX, 1795, p. 100.
Chaetodon vagabundus Bloch, Schneider, Syst. ichth. 1801, p. 222.
Chaetodon pictus Bloch, Schneider, ibidem.
Chaetodon vagabundus Lacépède, Hist. nat. Poiss. IV, 1802, pp. 456, 479.
Chaetodon pictus Lacépède, loc. cit. pp. 457, 484.
Chaetodon vagabundus Bennett, Fish. Ceylon 1828, Pl VII.
Chaetodon vagabundus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 50.
Chaetodon decussatus Cuvier & Valenciennes, loc. cit. p. 54.
Chaetodon pictus Cuvier & Valenciennes, loc. cit. p. 55.
Chaetodon nesogallicus Cuvier & Valenciennes, loc. cit. p. 63. (juv.).
Chaetodon vagabundus Bleeker, Journ. Indian Arch. II, 1848, p. 633. — Verh. Bat. Gen. XXIII (1849) 1850, Chaetodont. p. 18.
Chaetodon decussatus Bleeker, loc. cit. p. 19.

Chaetodon nesogallicus Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 240.
Chaetodon pictus Bleeker, loc. cit. p. 177.
Chaetodon vagabundus Rüppell, Samml. Senckenberg. Mus. 1852, p. 9.
Chaetodon decussatus Bleeker, Nat. Tijdschr. Ned. Indië XIX, 1859, pp. 331, 333.
Chaetodon vagabundus Kaup, Arch. f. Naturgesch. XXVI, 1860, p. 154.
Chaetodon pictus Kaup, ibidem.
Chaetodon nesogallicus Kaup, ibidem.
Chaetodon pictus Günther, Cat. Brit. Mus. II, 1860, p. 24.
Chaetodon vagabundus Günther, loc. cit. p. 25.
Sarothrodus vagabundus Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 152.
Tetragonopterus nesogallicus Bleeker, loc. cit. p. 234.
Tetragonopterus vagabundus Bleeker, ibidem.
Chaetodon decussatus Kner, Fische Novara-Exp. 1863—1865, p. 101.
Chaetodon vagabundus Kner, loc. cit. p. 271.
Chaetodon vagabundus Playfair, Fish. Zanzibar 1866, p. 34.
Chaetodon pictus Klunzinger, Verh. Zool. Bot. Gesell. Wien XX, 1870, p. 718.
Chaetodon vagabundus Günther, Fische Südsee 1873—75, p. 43.
Chaetodon vagabundus Peters, Monatsber. Akad. Berlin 1876, p. 437.
Tetragonoptrus (Linophora) vagabundus Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877, Révis. Chétodont. p. 94. — Atl. ichth. IX, 1877, p. 48.
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Chaetodon vagabundus Günther, loc. cit. p. 34.
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Chaetodon pictus M. Weber, Jenaische Denkschr. VIII, 1895, p. 104.
Chaetodon vagabundus Steindachner, Abh. Senckenb. nat. Ges. XXV, 1900, p. 420.
Chaetodon vagabundus Fowler, Proc. Acad. Nat. Sc. Philadelphia 1900, p. 520.
Chaetodon vagabundus Steindachner, Denkschr. Akad. Wien LXXI, 1902, p. 138.
Chaetodon vagabundus Jordan & Fowler, Proc. U. S. Nat. Mus. XXV, 1902. p. 532.
Chaetodon vagabundus Jordan & Seale, Bull. Bur. Fish. XXV, 1906, p. 339.
Chaetodon vagabundus Jordan & Starks, Proc. U. S. Nat. Mus. XXXII, 1907, p. 507.
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Chaetodon vagabundus Snyder, Proc. U. S. Nat. Mus. XLII, 1912, p. 422.
Chaetodon vagabundus M. Weber, Fische Siboga-Exp. 1913, p. 307.
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Chaetodon pictus Jordan & Starks loc. cit. p. 458.
Chaetodon vagabundus Mc Culloch, Rec. Austral. Mus. XIV, 1923, p. 3.
Chaetodon decussatus Ahl, Arch. f. Naturg. LXXXIX, 1923, p. 152.

Chaetodon vagabundus Ahl. loc. cit. p. 153.
Chaetodon vagabundus var. *pictus* Ahl, loc. cit. p. 154.
Chaetodon vagabundus var. *jordani* Ahl, loc. cit. p. 181.
Chaetodon pictus Ahl, loc. cit. p. 182.
Chaetodon vagabundus Barnard, Ann. S. African Mus. XXI, 1925—1927, p. 611.
Chaetodon vagabundus Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 32.
Chaetodon vagabundus Fowler, Fish. Oceania Bishop Mus. X, 1928, p. 253.
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Chaetodon vagabundus Duncker & Mohr, Mitt. Zool. Mus. Hamburg XLIV, 1929, p. 73.
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Chaetodon vagabundus Whitley, Rep. Great Barrier Reef Exp. IV, 1932, p. 288.
Chaetodon vagabundus Herre, Journ. Pan-Pacific Res. Inst. VI, 1931, pp. 7. 10, 12; VII, 1932, p. 41.
Chaetodon vagabundus Giltay, Rés. Sc. Voyage Indes orientales néerl. Prince Leopold Belg. V, 1933, p. 68.

D. usually XIII, 22—25; A. III, 20—22; L.r. 30—35; L.tr. $\frac{5-6}{14-16}$.

Orbicular, with much elevated rounded dorsal profile, rostro-ventral profile slightly convex, rostro-dorsal profile a little concave till eye, thence rapidly ascending with slight convexity toward dorsal. Height 1.5—1.6, head 2.8—3.5 in length. Eye midway in small head, about 3—3.5 in its length, longer than slightly convex interorbital space, less than 1.5 in snout, which goes 2.6—2.8 in head and is somewhat pointed and rather prominent. Gape of mouth small and somewhat oblique. Rounded angel of preoperculum scarcely denticulate. Scales in middle part of trunk as in Ch. auriga: above lateral line rounded and smaller than the large rhombic ones below it, which are arranged in regular oblique series, diminishing in size and rounded on head, chest and toward median fins. Lateral line strongly arched, reaching termination of dorsal. Spinous dorsal longer than soft, spines strong, the middle ones the longest, in adult the eight ultimate subequal, less than twice in head; soft dorsal and anal angularly rounded; third anal spine about 1.5 in head. Pectorals pointed, shorter than head; ventrals about 1.5 in its length. Caudal convex, least height of its peduncle more than diameter of eye. Ground colour in alcohol yellowish, from supra-pectoral part of operculum run six dark lines toward dorsal; from the last of them run about 10 similar lines in opposite direction toward belly, anal and caudal peduncle, the first of them usually before base of pectoral; a blackish white-margined ocular band from occiput to below isthmus, narrower than eye but broadening below it, narrowly separated from its fellow below, united with that above; a similunar band begins at base of dorsal spines, runs, while getting broader, along middle of soft dorsal, is continued over caudal peduncle and reaches with a point the middle of anal (an extension of the similunar band may more or less completely occupy the soft dorsal, anal and caudal peduncle (Ch. pictus)); anterior part of border of soft dorsal and anal black, likewise a broad transverse band in middle of caudal and a lighter one near its margin which is hyaline. Length up to 170 mm.

Habitat: Puluh Weh!; Sumatra (Atjeh!, Siboga, Tandjong, Kauer, Benkulen, Trussan, Padang, Priaman); Batu Isl.; Nias; Java (Batavia!, Patjitan, Karangbollong); Bawean; Sumbawa; Christmas Isl.!; Timor!; Lamakera!; Celebes (Menado!, Makassar!, Tanawanko, Tombariri); Sangir; Ternate; Batjan; Buru; Ceram!; Ambon!; Haruku; Goram; Banda!; Aru Isl.; Misol; Kisser!; New Guinea (Astrolabe Bay)!. — Red Sea, Aden, Zanzibar, Mozambique, Natal, Bourbon, Mauritius, Madagascar, South Arabia, India, Ceylon, Andamans, Nicobars, South China, Japan, Formosa, Riu Kiu Isl., Philippines, Australia (Queensland, Low Isl., Murray Isl.), Bismarck Archipelago, New Hebrides, Solomons, Polynesia.

Note. This common species with a wide range in the tropical indopacific region, shows variations in colour, which have induced some authors to describe them as proper species regarding only the colour pattern, partly depending from age, and not the fact that there are no morphological differences. *Ch. nesogallicus* C.V. is a juvenile stage characterized by a white margined black ocellus in the soft dorsal, similar to that of the young of *Ch. lunula* (Lac.), which later on is situated as an oval, inferiorly white-margined patch in the border of the soft dorsal and finally disappears as Ahl has shown, in the black margin of the soft dorsal. The figures of Bleeker, Day, Herre & Montalban show the usual extension of the semilunar band, running from base of spinous dorsal, broadening near base of soft dorsal and continued over caudal peduncle to soft anal; this is the so-called var. *vagabunda*, while in var. *picta* this band occupies in various degrees of development more or less completely both soft fins. Both varieties occur in the Archipelago but *picta* is much rarer.

3. **Anisochaetodon (Linophora) rafflesi** (Bennett.).

Chaetodon rafflesi Bennett, Life of Raffles 1830, p. 689.
Chaetodon princeps Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1931, p. 33.

Chaetodon sebae Cuvier & Valenciennes, loc. cit. p. 52.
Chaetodon princeps Lesson, Zool. in Voyage Coquille II, (1830) 1831, p. 177.
Chaetodon sebae Bleeker, Journ. Ind. Arch. II, 1848, p. 633.
Chaetodon princeps Bleeker, Verh. Batav. Gen. XXIII, (1849) 1850, p. 19.
Chaetodon rafflesii Günther, Cat. Brit. Mus. II, 1860, p. 27.
Sarothrodus princeps Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 156.
Tetragonopterus rafflesi Bleeker, loc. cit. p. 234.
Chaetodon rafflesii Günther, Fische Südsee 1873—1875, p. 44.
Chaetodon rafflesi von Martens, Preuss. Exp. Ost-Asien 1876, p. 358.
Chaetodon rafflesi Peters, Monatsber. Akad. Berlin 1876, p. 832.
Tetragonoptrus (*Linophora*) *rafflesi* Bleeker, Versl. Akad. Amsterdam (2) X, 1876, p. 319. Verh. Akad. Amsterdam XVII (1876) 1877, Révision Chétodont. p. 97. — Atl. ichth. IX 1877, p. 49.
Chaetodon rafflesi Günther, Zool. Reports Challenger Exp. VI, 1880, p. 34.
Chaetodon rafflesi Macleay, Proc. Linn. Soc. N. S. Wales VII, 1882, p. 242.
Chaetodon rafflesi Meyer, An. Soc. Española Hist. Nat. XIV, 1885, p. 17.
Chaetodon rafflesii M. Weber, in Semon, Zool. Forschungsreise, V, 1895, p. 264.
Chaetodon rafflesi Jordan & Seale, Bull. Bur. Fish. XXV, (1905) 1906, p. 339.
Chaetodon rafflesi Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 158.
Chaetodon rafflesii Fowler & Bean, Proc. U. S. Nat. Mus. LXXI, 1927, p. 8.
Chaetodon rafflesi Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 36.
Chaetodon rafflesi Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 253.
Chaetodon rafflesii Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 125.
Chaetodon rafflesi Duncker & Mohr, Mitt. Zool. Mus. Hamburg, XLIV, 1929, p. 73.
Chaetodon rafflesi Herre, Notes Fish. Stanford Univ. 1931, p. 60.

D. XIII, 22—23; A. III, 19—20; L.r. 29—30; L.tr. $\frac{6-7}{14}$.

Nearly rhombic, with ascending, posteriorly elevated dorsal and ventral outline, rostro-dorsal profile with a strong concavity till above eye thence ascending slightly convex till dorsal; height 1.6—1.7, head somewhat more or less than thrice in length. Eye situated high up, about midway in length of head, greater than slightly convex interorbital space, 1.2—1.5 in snout, which goes 2.5—2.8 in head, is straight and conical, produced. Gape of mouth small, oblique; teeth laterally far distant from corner of mouth. Rounded angel of preoperculum scarcely indentated. Scales rounded, rather large on sides of trunk, in somewhat irregular oblique series, gradually diminishing in size towards caudal peduncle and median fins, not towards chest, much smaller on head; lateral line highly arched, concurrent with base of dorsal, terminating before its end. Spinous dorsal about the distance of the five anterior spines longer than soft dorsal, spines rather strong; in young (till about 100 mm.) the fifth and sixth spine slightly the longest about 1.6 in head, later on in adult graduated to fifth spine, the following subequal; soft dorsal angularly rounded, soft anal more obtusely rounded, its second and third spine subequal, as long as head without snout. Pectorals 1.5 or less in head, ventrals acute, reaching anus, their spine equal to head without snout. Caudal slightly convex, least height of its peduncle somewhat more than diameter of eye. Colour in alcohol yellowish green or brown, sides of body with dark oblique streaks crossing each other in a checkered form, the ascending ones are continued on dorsal and become curved posteriorly; they readily faint in alcohol as also a round large patch on forepart of back; a more or less white-edged blackish ocular band runs from near origin of dorsal, where it meets its fellow, toward border of suboperculum, getting broader inferiorly, slightly narrower than eye while crossing it; soft dorsal with a broad intramarginal brown band, narrowly originating on top of last dorsal spines. A similar band crosses middle of caudal, its broad border is hyaline; soft anal with a hyaline border and a broad intramarginal line. Juvenile specimens up to 60 mm. length have a more or less regularly rounded black ocellus on the posterior half of the soft dorsal near its border, which successively develops into the intramarginal band. Length up to 155 mm.

Habitat: Sumatra (Padang, Ulakan, Priaman); Nias!; Java (Batavia!, Prigi); Bawean; Sumbawa; Timor!; Celebes (Menado)!; Halmaheira; Ternate; Ceram!; Ambon!; Banda Sea!; Haruku; Goram; Waigeu; Aru; New Guinea (Astrolabe Bay!, Biak!, Tarfia! in clear mountain stream, about 1 km. from coast). — Philippines, Pelew Isl., Bismarck Archipelago, Sipora, Fidji Isl.

4. **Anisochaetodon (Linophora) chrysurus** (Desjardins). (Fig. 28).

Chaetodon chrysurus Desjardins, Proc. Zool. Soc. London 1833, p. 117.
Chaetodon xanthurus Bleeker, Acta Soc. Sc. Indo-Neerl. II, 1857, p. 53.
Chaetodon xanthurus Günther, Cat. Brit. Mus. II, 1860, p. 515.
?*Citharoedus mertensi* Kaup, Arch. Naturgesch. XXVI, 1860, p. 143.
Tetragonopterus xanthurus Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 287.
Chaetodon guttatissimus (?) Klunzinger, Verh. Zool. Bot. Ges. Wien XX, 1870, p. 780.
Tetragonoptrus chrysurus Bleeker, in Rech. faune Madagascar de Pollen & v. Dam. Enumeration Poissons 1875, p. 95.
Tetragonoptrus (Linophora) xanthurus Bleeker, Verh. Akad. Amsterdam, XVII, (1876) 1877, Révision Chétodont. p. 99.
Tetragonoptrus (Linophora) mertensi Bleeker, Atl. ichth. IX, 1877, p. 50. — Verh. Akad. Amsterdam XVIII, (1877) 1878, Poiss. Maurice p. 13 (nec C. V.).
Chaetodon xanthurus De Vis, Proc. Linn. Soc. N. S. Wales VIII, 1883, p. 457.

Chaetodon mertensii Day, Fish. India 4°, 1878—1888, p. 105. (nec C. V.).
Chaetodon (Anisochaetodon) mertensii Klunzinger, Fische Roth. Meer 1884, p. 57 (nec C. V.).
Chaetodon chrysurus Day, Fish. Brit. India II, 1889, p. 6.
Chaetodon (*Tetragonoptrus*) *xanthurus* Sauvage, Poiss. Madagascar 1891, p. 261.
Chaetodon xanthurus Jordan & Seale, Bull. Bur. Fish. XXV, (1905) 1906, p. 339.
Chaetodon chrysurus Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 161.
Chaetodon chrysurus subsp. paucifasciatus Ahl, loc. cit. p. 162.
Chaetodon chrysurus subsp. madagascariensis Ahl, loc. cit. p. 163.
Chaetodon chrysurus subsp. xanthurus Ahl, ibidem.
Chaetodon chrysurus Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 35.
Chaetodon mertensii Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 254 (p.p.).
Chaetodon mertensii Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 127 (p.p.).

D. XIII, 22; A. III, 16—17; L.r. 29—30; L.tr. $\frac{5-6}{13-14}$.

Orbicular, dorsally much elevated, rostro-dorsal profile concave before eye thence with very slight convexity steeply ascending to dorsal, height 1.6—1.8, head 3.2—3.6 in length. Eye 3 to 3.5, situated somewhat before midway head, above horizontal through mouth, equal to or greater than broadly convex interorbital space, somewhat shorter than not much produced blunt snout, with small, horizontal mouth; the teeth conspicuous in anterior part of jaws. Preoperculum nearly entire. Scales on flanks equally large and of equal rhombic form above and below lateral line, remarkably large in middle of anterior part of trunk, where they number about six in a longitudinal series; much smaller on head, nape, pectoral region, chest, caudal peduncle and sheath of median fins; lateral line not much arched, concurrent with back, terminates near end of dorsal. Spinous dorsal about the distance of the three or four anterior spines longer than soft dorsal which is broadly rounded, the spines increasing in height to fifth, which goes about 1.6 in head, the sequent subequal; anal angularly rounded, its third spine the longest, longer than head without snout. Pectorals shorter than head; ventrals about equal head excluding snout. Caudal slightly convex, least height of caudal peduncle about thrice in head. In alcohol yellowish white, intenser yellow on caudal peduncle and neighbouring parts of soft dorsal and anal; scales on trunk with a dusky border giving, according to preservation, the impression of chevronlike dark lines or streaks, their angle directed forward or giving a checkered appearance with oblique brownish streaks, which cross each other, following the series of scales. On the nape, before the dorsal a median white or yellowedged horse-shoe shaped dark brown patch, a similar short ocular band, usually dorsally independent from its fellow and narrower than eye crosses it and terminates on suboperculum; soft dorsal, anal and caudal with a dark line inside of a hyaline margin. Length up to 115 mm.

Habitat: East coast of Sumatra; Ambon!. — Red Sea, Madagascar, Mauritius, Ceylon, Philippines.

Note. There is some confusion about this species; as it is confounded with *Ch. mertensi* C.V., a species very insufficiently described after a figure by one of the naturalists of the russian expedition of Lütken, from unknown habitat. It is perhaps admissible to retain this name for *Ch. mertensi* described by Günther (Fische Südsee p. 45) from Paumotu and again by Jordan & Seale (Bull. Bur. Fish. XXV) from Apia and Pago Pago, who called Garrett's figure „excellent" and also recognised its difference from *Ch. xanthurus* Blkr. Identical with *mertensi* (C.V.) Günther seems to be *Ch. dixoni* Regan (Ann. Mag. N. Hist. (7) XIII, 1904, p. 277) from New Hebrides,

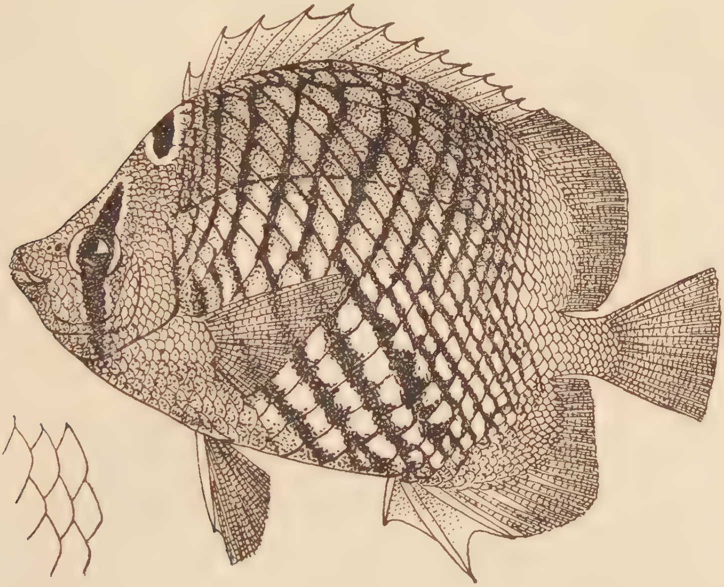

Fig. 28. *Anisochaetodon (Linophora) chrysurus* Desjardin. n. s. A. separate group of anterior rhombic trunk scales.

the „figure of which differs but little from that of Garrett as reproduced by Günther", as Fowler (Bishop Mus. X, 1928, p. 254) states. *Ch. mertensi (dixoni)* seems therefore to be a rare species restricted to the Pacific Islands. It differs from *chrysurus* Desj. (1833) and *xanthurus* Blkr. (1857) as is evident from the identical figures published by Bleeker, Sauvage and Day, (after correction of the squamation, the trunk-scales being drawn too small) and more so from the descriptions of Bleeker, Sauvage, Day and Herre & Montalban which are conform with Klunzinger's description. This species which occurs in the Red Sea, Mauritius, India, Ceylon, indo-australian Archipelago and Philippines ought to be called *chrysurus* Desjardins (1833) as already Day (1889), Ahl and Herre & Montalban have done. The name *chrysurus* Desj. is not as Fowler & Bean seem to think, preoccupied by Bloch, Schneider who used it for a „Chaetodon" with „aculeus ad opercula" thus for a *Pomacanthus,* not a *Chaetodon.*

3. Subgenus **Oxychaetodon** Bleeker.

(Bleeker, Arch. Néerl. Sc. Nat. XI, 1876, p. 306).
[Type *Chaetodon lineolatus* C. V..] See page 96.

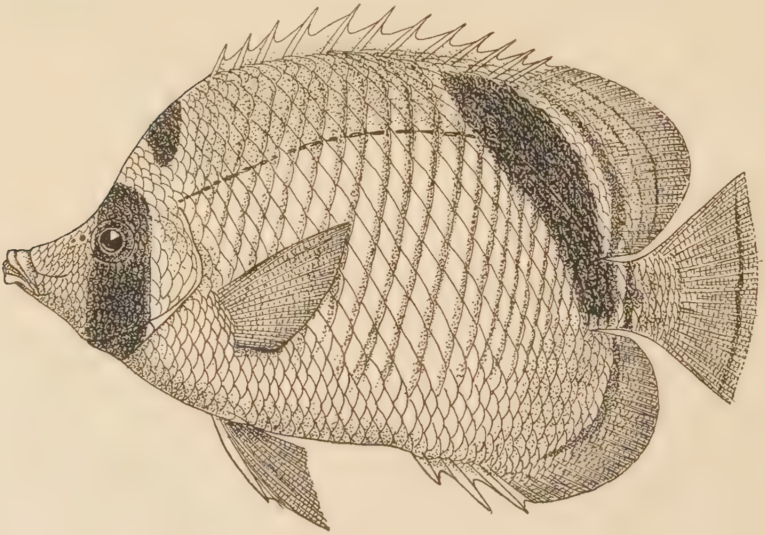

Fig. 29. *Anisochaetodon (Oxychaetodon) lineolatus* C. V. × 4/7.

1. **Anisochaetodon (Oxychaetodon) lineolatus** C.V. (Fig. 29).

Chaetodon lineolatus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 40.

Chaetodon lunatus Cuvier & Valenciennes, loc. cit. p. 57.
Chaetodon lunatus Rüppell, Neue Wirbelth. Fische, 1835, p. 30.
Chaetodon lunatus Rüppell, Samml. Senckenb. Mus. 1852, p. 9.
Chaetodon oxycephalus Bleeker, Nat. Tijdsch. Ned. Indië, IV, 1853, p. 603.
Chaetodon Tallii Bleeker, Nat. Tijdschr. Ned. Indië VI, 1854, p. 97.
Chaetodon lineolatus Bleeker, loc. cit. p. 323. — Nat. Tijdschr. Ned. Indië XV, 1858, p. 459.
Chaetodon lunatus Bleeker, Nat. Tijdschr. Ned. Indië XIX, 1859, p. 331.
Chaetodon oxycephalus Günther, Cat. Brit. Mus. II, 1860, p. 27.
Chaetodon lineolatus Günther, loc. cit. p. 30.
Chaetodon lineolatus Kaup, Arch. f. Naturgesch. 1860, p. 157.
Tetragonopterus oxycephalus Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 234.
Tetragonopterus lineolatus Bleeker, loc. cit. p. 251.
Chaetodon lineolatus Playfair, Fish. Zanzibar 1866, p. 35.
Chaetodon lineolatus Klunzinger, Verh. Zool. Bot. Ges. Wien XX, 1870, p. 779.
Chaetodon lineolatus Günther, Fische Südsee 1873—1875, p. 45.
Chaetodon oxycephalus Peters, Monatsber. Akad. Berlin, 1876, p. 832.
Tetragonoptrus (Oxychaetodon) lineolatus Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877, Rév. Chétodont. p. 102. — Atl. ichth, IX, 1877, p. 51. — Verh. Akad. Amsterdam XVIII (1877) 1878, Poiss. Maurice, p. 495.
Chaetodon lineolatus Macleay, Proc. Linn. Soc. N. S. Wales VII, 1882, p. 243.
Chaetodon (Anisochaetodon) lineolatus Klunzinger, Fische Roth. Meer. 1884, p. 57.
Chaetodon lineolatus Ramsay & Ogilby, Proc. Linn. Soc. N. S. Wales (2) I, 1886, p. 8.
Chaetodon lineolatus Steindachner, Denkschr. Akad. Wien LXX, 1900, p. 489.
Chaetodon lineolatus Jordan & Evermann, Proc. U. S. Nat. Mus. XXV, 1902, p. 357.
Chaetodon lineolatus Jordan & Evermann, Bull. U. S. Fish Comm. XXIII, (1903) 1905, p. 365.
Chaetodon lineolatus Jordan & Seale, Bull. Bur. Fish. XXV, (1905) 1906, p. 340.
Chaetodon lineolatus Pellegrin, Ann. Mus. Zool. Napoli (n.s.) III, 1912, p. 6.
Chaetodon lineolatus Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 167.
Chaetodon lineolatus var. *oxycephalus* Ahl, loc. cit. p. 169.
Chaetodon lineolatus Mc Culloch, Rec. Austral. Mus. XIV, 1923, p. 4.
Chaetodon lineolatus E. K. Jordan, Proc. U. S. Nat. Mus. LXVI, 1925, p. 21.
Chaetodon lineolatus Fowler & Bean, Proc. U. S. Nat. Mus. LXXI, 1927, p. 8.
Chaetodon lineolatus Herre & Montalban, Philippine Journal Sc. XXXIV, 1927, p. 47.
Chaetodon lineolatus Fowler, Fish Oceania, Bishop Mus. X, 1928, p. 255.
Chaetodon lineolatus Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 130.
Chaetodon oxycephalus Fowler & Bean, loc. cit. p. 132.
Chaetodon lineolatus Herre, Notes Fish. Stanford Univ. 1931, p. 60.

D. XII, 24—27; A. III, 20—21; L.r. 20—22; L.tr. $\frac{7-8}{15-16}$.

Compressed, nearly oval, dorsal and ventral profile regularly convex, the first more so; rostro-dorsal profile deeply concave till above eye, thence steep and slightly convex to dorsal. Height

1.5—1.7, head 2.5—3.1 in length, about as long as deep. Eye about in middle of head, 3.3 to more than four in head, nearly equal to or shorter than convex interorbital space; according to age, more or less than twice in snout, which goes twice in head, is prominent, nearly horizontal and conical. Cleft of mouth small, horizontal; brushlike teeth conspicuous, the mandibulary ones usually somewhat longer. Preoperculum slightly serrate. Scales on sides of trunk large, rhombic, in regular oblique series, smaller on head and chest, toward median fins very small on their sheaths; lateral line ascending in a nearly straight line towards end of first third of soft dorsal, thence it curves down along base of dorsal and terminates with it. Spinous dorsal longer than soft, the spines graduated till about seventh, the following about equal but less strong and about half as long as head as likewise the two last anal spines; the soft dorsal and anal angularly rounded. Pectorals and ventrals acute, both 1.7 or less in head; ventrals barely reaching vent. Caudal slightly convex, least height of its short peduncle about equal eye. Greyish in alcohol, whitish in life, fins yellowish, a blackish brown ocular band, wider than eye, runs from occiput to isthmus and is partially or completely interrupted on front above eye; a large crescent shaped patch from base of soft dorsal and last dorsal spines to posterior half of base of soft anal, gradually narrowing toward anal; from base of dorsal spines and base of crescent shaped patch about 20 dark lines, following the vertical series of scales, run down to below level of pectorals; hyaline border of caudal with a black intramarginal line. The variety oxycephalus after Bleeker, with two or three reddish or violet longitudinal lines on soft dorsal and anal, and a transverse line on caudal peduncle. Length up to 300 mm.

Habitat: Sumatra (Isl. Tikus); Java (Patjitan); Cocos Isl.; Sumbawa; Flores; Ternate; Ambon; Banda; New Guinea. — Red Sea, Zanzibar, Mauritius, Seychelles, Formosa, Pescadores Isl., Philippines, Queensland, New Hannover, Solomons, New Hebrides, Polynesia northwards to Hawaii, southwards to Society Isl.

This is the largest species of Chaetodon.

2. **Anisochaetodon (Oxychaetodon) falcula** (Bloch).

Chaetodon falcula Bloch, Ausländ. Fische IX, 1795, p. 102, tab. 425, fig 2.
Chaetodon falcula Bloch, Schneider, Syst. ichth. 1801, p. 225.
Pomacentrus falcula Lacépède, Hist. nat. Poiss. IV, 1802, pp. 506, 511, 513.

Chaetodon ulietensis Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 39.
Chaetodon falcula Cuvier & Valenciennes, loc. cit. p. 41.
Chaetodon dizoster Cuvier & Valenciennes, loc. cit. p. 527.
Chaetodon falcula Bleeker, Verh. Batav. Gen. XXV, 1853: Bengalen & Hindostan p. 40.
Chaetodon falcula Peters, Monatsber. Akad. Berlin, 1855, p. 438.
Chaetodon falcula Bleeker, Nat. Tijdschr. Ned. Indië VIII, 1855, p. 311.
Chaetodon ulietensis Bleeker, Act. Soc. Sc. Indo-Neerl. I, 1856, Moluksche Archipel, p. 38.
Chaetodon falcula Günther, Cat. Brit. Mus. II, 1860, p. 17.
Chaetodon dizoster Günther, loc. cit. p. 17.
Chaetodon ulietensis Günther, loc. cit. p. 18.
Chaetodon falcula Kaup, Arch. f. Naturgesch. XXVI, 1860, p. 151.
Chaetodon dizoster Kaup, loc. cit. p. 152.
Chaetodon ulietensis Kaup, ibidem.
Tetragonopterus falcula Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 286.
Tetragonopterus ulietensis Bleeker, loc. cit. p. 287.
Chaetodon falcula Playfair in Playfair & Günther, Fish. Zanzibar, 1866, p. 33.
Chaetodon falcula Günther, Fische Südsee, 1873—1875, p. 39.
Tetragonoptrus (*Oxychaetodon*) *falcula* Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877, Chétodont. p. 104. — Atl. ichth. IX, 1877, p. 52. — Arch. Néerl. Sc. Nat. XIII, 1878, p. 45.
Chaetodon falcula Day, Fish. India 4°, 1878—1888, p. 104.
Chaetodon falcula Macleay, Proc. Linn. Soc. N. S. Wales, VII, 1882, p. 242.
Chaetodon aurora De Vis, Proc. Linn. Soc. N. S. Wales IX, 1885, p. 453.
Chaetodon falcula Sauvage, Poissons Madagascar, 1891, p. 515.
Chaetodon falcula Jatzow & Lenz. Abh. Senckenberg. Nat. Ges. XXI, 1899, p. 502.
Chaetodon falcula Seale, Occas. Papers Bishop Mus. I, 1901, p. 101.
Chaetodon ulietensis Jordan & Seale, Bull. Bur. Fish. XXV, 1906, p. 340.
Chaetodon falcula Evermann & Seale, Bull. Bur. Fish. XXVI, 1906, p. 96.
Chaetodon falcula Steindachner, Sitzb. Akad. Wien CXV, 1906, p. 1390.
Chaetodon ulietensis Jordan & Snyder, Proc. U. S. Nat. Mus. XXIX, 1906, p. 355.
Chaetodon ulietensis Snyder, Proc. U. S. Nat. Mus. XLII, 1912, p. 510.
Chaetodon falcula Ogilby, Mem. Queensl. Mus. I, 1912, p. 54.
Chaetodon dizoster Ahl, Arch. f. Naturgesch. LXXXIX, 1923, p. 169.
Chaetodon falcula Ahl, loc. cit. p. 170.
Chaetodon ulietensis Ahl, loc. cit. p. 171.
Chaetodon ulietensis var. *confluens* Ahl, loc .cit. p. 172.
Chaetodon ulietensis subsp. *aurora* Ahl, loc. cit. p. 172.
Chaetodon falcula Barnard, Ann. S. African Mus. XXI, 1925—27, p. 612.
Chaetodon ulietensis Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 46.
Chaetodon falcula Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 255.
Chaetodon falcula Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 134.
Chaetodon ulietensis Herre, Notes Fish. Stanford Univ. 1931, p. 60.

D. XII, 24—27; A. III, 20—22; L.r. ca. 25; L.tr. $\frac{6-7}{14}$.

Orbicular, posteriorly more elevated, anteriorly pointed by the prominent pointed snout; rostro-dorsal profile above eye rather steeply ascending in a nearly straight line, before dorsal passing over in convexity of back, before eye concave till maxillaries. Height 1.5—1.8, head about thrice in length. Eye 3.6 to about four in head, nearly equal to slightly convex interorbital space and 1.6 to nearly twice in snout, which goes more than twice in length of head. Cleft of mouth horizontal, mandibula rather prominent. The conspicuous brushlike teeth in both jaws about equally long. Rounded angel of preoperculum nearly edentulous, its inferior border sinuated. Scales large, in horizontal series, in upper part of trunk somewhat arched, diminishing in size posteriorly, much smaller on head, chest and median fins; lateral line arched till about below origin of soft dorsal, thence abruptly descending till termination of dorsal. Spinous dorsal about four spines longer than base of rounded soft dorsal, spines with incomplete membrane, gradually increasing in height till sixth or seventh, the following subequal, the four last less strong, more than twice in head. Pectorals 1.2, ventrals 1.3 in head, the first ray prolonged into a short seta. Caudal convex, least height of its peduncle as long as eye. Colour in alcohol yellowish, eye crossed by a brown white-bordered band as broad as eye, beginning much narrower on front and running to isthmus where it is united with its fellow; on trunk descend two triangular patches, one from about the four anterior dorsal spines to below lateral line, or its point reaches to below pectoral, the second from front of soft dorsal, including the last dorsal spines, to lateral line; on flanks ten to fifteen vertical, often rather faint dark lines; base of caudal peduncle with a blackish ring, faintly continued on soft dorsal and anal, caudal with a submarginal dark band. Length up to 200 mm.

Habitat: Batu Isl.; Pulu Weh (Sabang Bay)!; Flores (Serbette Isl.)!; Ambon; Ternate; New Guinea. — Red Sea, East coast of Africa till Mozambique, Mauritius, India, Nicobars, Riu Kiu Isl., Philippines, Queensland, Melanesia, Polynesia, Micronesia.

Note. We have united *Ch. falcula* and *ulietensis* as already Günther and Bleeker have done. Jordan & Seale say that both authors have confounded the two species, but they have overlooked, that Günther, while describing *falcula,* expressly says, that he had before him the original drawing on which Cuvier created *ulietensis* and that he has no doubt about its identity with *falcula.* Ahl distinguished specifially *falcula* and *ulietensis,* but his description of both is verbatim the same and differs only in some points of its colour-pattern. Also the latest authors on *Chaetodon:* Fowler & Bean unite them. So we come to the conclusion that *ulietensis* is a colour-variety occurring in the Pacific but f. i. also in the Philippines, while *falcula* seems to be proper to the Indic and the Indo-australian Archipelago but Steindachner (Sitzb. Akad. Wien CXV, 1906, p. 1390) records two young specimens also from Samoa. Its feature is good represented in the figures of Bleeker and Day, *ulietensis* in the figure of Günther. Fowler referring to the great difference of the figures of these authors, states that the union of the two dark-bands across the spinous dorsal does not obtain in his specimens from the Pacific islands and that the differences are conditions of age.

3. Subfam. **Pomacanthinae.**

Body oblong oval to subrhomboid, less compressed than Chaetodontinae, often even robust. Head and body covered with hard, ctenoid scales, their surface with longitudinal striae or rugosities, elliptical or rounded of small or large size, smaller on head and

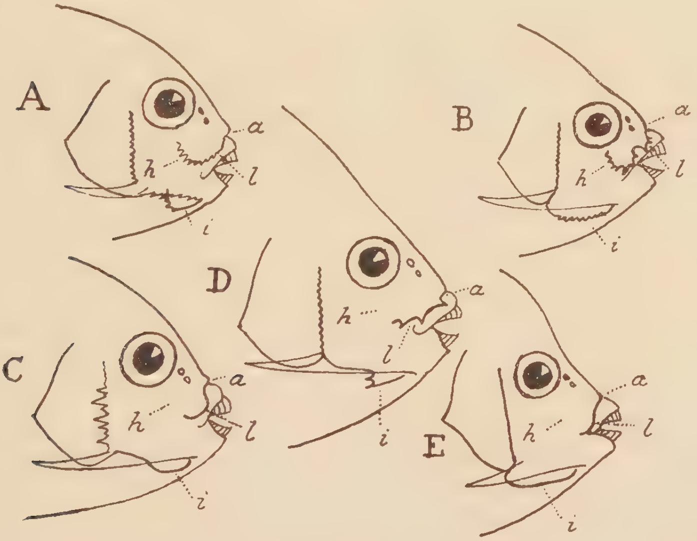

Fig. 30. Form of preorbital and interoperculum bones in A, Centropyge; B, Genicanthus; C, Pygoplites; D, Holacanthus; E, other genera.. a anterior, l lower, h hindmargins of preorbital; i interoperculum. After Fraser-Brunner.

median fins, on head often minute or even velvety, on trunk in regular series or irregular and unequal, in many cases with scattered or universal small supplemental scales (auxiliaries Fraser-Brunner) at base of scales, more developed with age and even wanting in young; lateral line arched, more or less concurrent with dorsal fin, complete and extending to caudal, at least to caudal peduncle or incomplete and terminating near end of dorsal. Snout not prolonged, usually blunt. Mouth small, terminal, more or less horizontal, jaws usually equal. Teeth slender, tricuspid or subtricuspid forming a brushlike band, on vomer present, rudimentary or absent. Gillopening wide, gillmembranes not united, free from isthmus or narrowly joined to it. In the normal preorbital is distinguishable an anterior, lower and hindmargin, which may be, at least partly, spinous, serrate or entire. The hindmargin may be free from the cheek, or it may be covered by the skin of the cheek (Fig. 30); preoperculum with serrate or coarsely denticulate hindmargin, the lower margin entire or with few spines or denticles; its angel with a strong backward directed spine. Interoperculum varies from large, oblong and entire to small, rounded and spinous. Dorsal continous with IX—XV usually graduated strong, moveable spines and 15 to 30 rays forming a rounded, angulate or prolonged soft part, shorter or longer than spinous. Anal with III spines and 15 to more than 20 rays, forming a fin about similar to soft dorsal. Caudal rounded, by exception emarginate, with 15 divided rays. Ventrals without an axillary scaly process. Otherwise similar to Chaetodontinae.

Distribution: Marine littoral fishes of small or moderate size, reaching by exception to 500 mm. length. Generally of brilliant colours and complicated pattern, in some species changing with growth, the young being quite unlike the adult in colouration. Inhabitants of tropical seas, abounding especially on coral reefs; feeding on small animals. Some of them valued as food.

The Pomacanthinae have lately been fully dealt with by Fraser-Brunner in his revision of the subfamily (Proc. Zool. Soc. London, 1933, p. 542). He has divided the old genus Holacanthus of Lacépède in several natural groups represented by at least seven genera and explained in an ampel morphological introduction the characters used in the definition of these genera. In their arrangement we have followed his key to these genera, which we here reproduce.

Key to the indo-australian genera of Pomacanthinae.

I. Scales small or moderate (75 or more) not in regular series. Hindmargin of preorbital not free; interoperculum large, without spines; interorbital width greater than eye.

A. Scales small or very small (85 or more), those of head and body subequal, not sharply differentiated. Lateral line terminating at end of soft dorsal, sometimes a separate portion on caudal peduncle. Posterior nostril the larger. Vertical fins not produced . . . . 1. *Chaetodontoplus* p. 122.

B. Scales moderate or small, more or less unequal, those of head very minute, velvety, sharply differentiated from those of body. Lateral line complete. Anterior nostril the larger. Vertical fins usually produced in adults. Young black with white markings. 2. *Pomocanthus* p. 129.

II. Scales large (50 or less), in regular series.

A. Interoperculum large, interorbital width greater than eye. Scales on operculum in six or more rows.

1. Lateral line complete. Scales on cheek irregular, unequal. Preorbital convex, its hindmargin not free. Interoperculum without spines. Pelvics reaching well beyond origin of anal. Caudal rounded . . . . 3. *Euxiphipops* p. 145.

2. Lateral line terminating at end of soft dorsal, sometimes a separate portion on caudal peduncle.

a. Preorbital notched mesially, its hindmargin free, serrated. Teeth in both jaws short. Scales on operculum in six to eight rows. Interoperculum with or without small spines. Caudal fin concave behind, its outer rays much produced . . . . 4. *Genicanthus* p. 150.

b. Preorbital without median notch, with or without spines, its hindmargin not free, never serrated. Teeth in lower jaw long. Scales on operculum in about nine rows. Interoperculum usually with spines anteriorly. Caudal fin truncate. 5. *Holancanthus* p. 154.

B. Interoperculum small. Lateral line terminating at end of soft dorsal.

1. Interoperculum without spines, posteriorly with a narrow branch reaching to suboperculum. Preorbital convex, without

spines, its hindmargin not free, not serrated. Interorbital width greater than eye. Scales on operculum in about eight rows. . . . . 6. *Pygoplites* p. 156.

2. Interoperculum serrated or with spines posteriorly, remote from suboperculum. Hindmargin of preorbital free, serrated or with strong spines. Interorbital width equal to or less than eye. Scales on operculum in five or less rows. . . . . . . 7. *Centropyge* p. 159.

1. **Chaetodontoplus** Bleeker.

(Bleeker, Arch. Néerl. Sc. Nat. XI, 1876, p. 307).
Genotype: *Holacanthus septentrionalis* Schlegel.

Oval to oblong, elevated, generally rather robust, covered by small or very small, subequal ctenoid scales with or without auxiliaries at their base, arranged on trunk in more or less irregular series, on head minute to velvety; lateral line arched, terminating at end of dorsal or less conspicuously continued on caudal peduncle. Mouth small, jaws even or the lower slightly in advance of upper; teeth slender, numerous, in brushlike series, equal or longer in lower jaw, none on vomer or rudimentary. Eye in adult smaller than interorbital space. Posterior nostril oval, slightly larger than

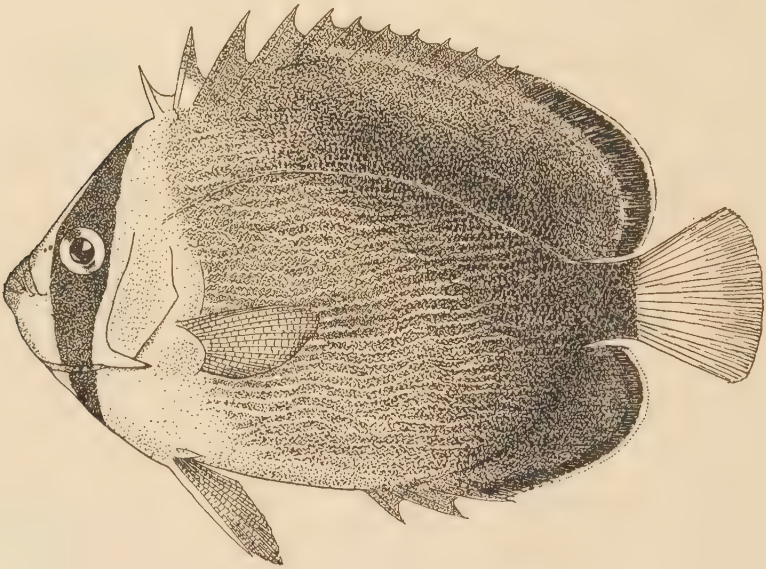

Fig. 31. *Chaetodontoplus mesoleucus* (Bloch) × 8/11.

rounded anterior. Preorbital without spines, its hindmargin not free. Preoperculum with serrate hindmargin, entire below; interoperculum large, without spines. Gillopening wide, gillmembranes not united, but narrowly joined to isthmus. Spinous dorsal much less than twice longer than soft, with XI to XIII graduate spines, the posterior equally long; soft dorsal and anal obtusely rounded and longer than high. Caudal rounded.

Distribution: Costal fishes of small or moderate size, principally inhabiting coral reefs in the Indo-australian Archipelago, the Chinese and Japanese Seas, the Philippines, Australia, New Britain, Lord Howe Isl., and Capricorn Group.

Key to the indo-australian species of Chaetodontoplus.

I. D. XI or XII. Scales with auxiliaries; 85 to about 100 in linea recta. A more or less defined ocular band may be present.
  1. D. XII, 16—17. L. r. about 85. Scales with auxiliaries in anterior half of trunk. Black ocular band as wide as eye from nape to chest, united above and below with its fellow. 1. *mesoleucus* p. 123.
  2. D. XI, 21—22. L. r. about over 100. Majority of scales on trunk with one auxiliary. A broad yellow band across operculum behind a more or less defined ocular band . . . . 2. *doubouleyi* p. 125.

II. D. XIII, 17—19. L. r. 110 or more. Scales on trunk without auxiliaries.
  1. Dorsal spines graduate to about fourth, the sequent subequal. Uniform blackish brown or upper half paler, head totally or anteriorly only yellowish with dark markings. . . . . 3. *melanosoma* p. 126.
  2. Dorsal spines graduate to last. Brown to yellowish with narrow blue black-edged stripes, at least on head and anterior part of trunk and more or less numerous on dorsal and anal . . 4. *septentrionalis* p. 127.

1. **Chaetodontoplus mesoleucus** (Bloch). (Fig. 31).

Chaetodon mesoleucus Bloch, Ausl. Fische III, 1787, p. 117.
Chaetodon mesomelas Gmelin, Syst. Nat. Linn. I, 1789, p. 1263.
Chaetodon mesomelas Forster, Fauna Indica, 1795, p. 15.
Chaetodon mesoleucus Bloch, Schneider, Syst. Ichth. 1801, p. 227.
Holacanthus mesoleucus Lacépède, Hist. Nat. Poiss. IV, 1802, pp. 528, 535.
Holacanthus mesoleucos Bleeker, Verh. Batav. Gen. XXIII, (1849) 1850, p. 26. — Nat. Tijdschr. Ned. Ind. VIII, 1855, p. 344. — loc. cit. XII, 1856—1857, p. 233. — Acta Soc. Indo-Neerl. VIII, 1860, p. 35.
Chaetodon atratus Gray, Cat. Fish. Gronow, II, 1854, p. 54.
Holacanthus mesoleucus Günther, Cat. Brit. Mus. II, p. 54.

Holacanthus mesoleucos Bleeker, Versl. Akad. Amsterdam XII, 1861, p. 50. — XIV, 1862, p. 118.
Holacanthus mesoleucos Kner, Fische Novara-Exp. 1865, p. 105.
Holacanthus mesoleucus Steindachner, Sitzb. Akad. Wien, LX, 1870, p. 561.
Chaetodontoplus mesoleucus Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877, p. 114. — Arch. Néerl. Sc. Nat. XII, 1877, p. 22. — Atl. ichth. IX, 1877, p. 56.
Holacanthus mesoleucus Karoli, Termeszitrajzi füzetek V, 1862, p. 10.
Holacanthus mesoleucus Meyer, An. Soc. Españ. Hist. Nat. Madrid XIV, p. 18.
Holacanthus mesoleucus Duncker, Mitth. Nat. Hist. Mus. Hamburg, XXI, 1904, p. 151.
Holacanthus mesoleucus Herre & Montalban, Philippine Journ. of Sc. XXXIV, 1927, p. 101.
Holacanthus mesoleucus Fowler & Bean, Bull. U. S. Nat. Mus. VII, 1829, p. 191.
Holacanthus (*Chaetodontoplus*) *mesoleucus* Whitley, Rec. Austral. Mus. XVI, 1928, p. 301.
Holacanthus mesoleucus Herre, Notes Fish. Stanford Univ. 1931, p. 61.
Chaetodontoplus mesoleucus Fraser-Brunner, Proc. Zool. Soc. London 1933, p. 549.

D. XII, 16—17; A. III, 16—17. L. r. about 85.

Oval, ventral profile evenly convex to tail, rostro-dorsal profile nearly straight with a slight convexity before dorsal, height about 1.6, head 3.7—4 in length. Eye 3.75—4 in head, nearly 1.5 in strongly convex interorbital space, longer than obtuse snout; mouth small horizontal, lower jaw slightly in advance of upper. Preoperculum with posterior and lower border denticulate, its spine longer or shorter than eye, occasionally differing on both sides in the same specimen; interoperculum with a rather long, finely serrate lower border, operculum with 10 to 12 series of scales. Scales minute, in anterior half of trunk with auxiliaries; lateral line conspicuous to end of dorsal, less conspicuously continued on caudal peduncle to caudal. Dorsal spines increasing in hight to sixth, thence subequal; sixth about 1.6 in head, longer than rays; soft dorsal and anal evenly rounded. Pectorals equal to head without snout, ventrals slightly longer, reaching vent. Caudal rounded, least hight of caudal peduncle about 2.2 in head. Colour yellowish on head and anterior part of trunk, shading posteriorly in dark violet or blackish, the sides with irregular vermiculating bluish lines, a black ocular band from nape to chest, about as wide as eye and above and below united with its fellow; top of snout black; caudal and paired fins yellow; soft dorsal and anal with a violet margin. Length up to 155 mm.

Habitat: Singapore!; Batu Isl.; Java (Batavia!); Duizend Isl.!; Borneo; Celebes (Makassar, Menado); Togian Isl.; Ceram; Batjan; Obi major; Halmahera. — Philippines, New Britain.

2. **Chaetodontoplus dubouleyi** (Gthr.) [1]).

Holacanthus duboulayi Günther, Ann. & Mag. Nat. Hist. (3) XX, 1867, p. 67.
Holacanthus duboulayi Macleay, Linn. Soc. N. S. Wales II, 1878, p. 352.
Holacanthus duboulayi Klunzinger, Sitzb. Akad. Wien 1880, p. 361.
Holacanthus duboulayi Macleay, Descr. Cat. Austral. Fish. I, 1881, p. 95.
Holacanthus darwiniensis Saville-Kent, Proc. Roy. Soc. Queensl. VI, 1870, p. 235.
Holacanthus duboulayi Mc Culloch, Rec. Austral. Mus. IX, 1913, p. 360. — Rec. W. Austral. Mus. I, 1913, p. 222.
Chaetodontoplus dubouleyi Ogilby, Mem. Queensl. Mus. III, 1915, p. 112. — V, 1916, p. 179.
Holacanthus duboulayi Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 194.
Chaetodontoplus duboulayi Fraser-Brunner, Proc. Zool. Soc. London 1933, p. 650.

D. XI, 21—22; A. III, 19—20; L.r. over 100.

Oval, ventral profile evenly rounded to tail, rostro-dorsal profile nearly straight to nape thence convex to dorsal. Height 1.4—1.8, according size; head 2,5—3,8 in length. Eye in middle of length of head, 3—4 in its length, situated high up, near outline of head, equal to or $^1/_3$ shorter than convex interorbital space, about equal to bluntly rounded snout; mouth small, jaws even. Preoperculum with denticulate hind-and lower border, angular spine as long as eye or shorter, grooved; interoperculum oblong, its straight lower margin entire in adult. Scales minute, the majority on trunk *with one auxiliary*, on operculum about 12 distinct rows. Lateral line slightly arched, terminating at end of dorsal, a series of sensory scales on middle of caudal peduncle reaching caudal. Dorsal spines graduated; soft dorsal and anal rounded. Pectorals about 1.3 in head, ventrals longer, acute, first ray produced, surpassing vent. Caudal slightly rounded, the corners somewhat produced; least height of caudal peduncle about half length of head. Deep brown fading into yellowish brown, a broad yellow band from below the three anterior dorsal spines and somewhat before them, running across operculum and behind base of pectoral, widening to base of ventral and ending near vent; a similar light bar along base of dorsal, narrowly beginning about below sixth dorsal spine and

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1) The species is named in honour of Mr. du Bouley, the first collector; the correct spelling of the species is therefore dubouleyi instead of duboulayi.

broadening continued on caudal peduncle. The brown colour of the body may be more or less interrupted by narrow, pale, longer or shorter wavy lines, or by light spots; dorsal and anal with interrupted bluish wavy longitudinal lines; caudal and paired fins yellowish; Head darkish. Length up to 195 mm.

Habitat: Aru Isls. (Dobo!). — Australia (Port Darwin, Cape York, Queensland, North West Coast).

New for the Indo-Australian Archipelago, according to two specimens collected 7. II, 1907 by Prof. P. N. van Kampen, seen by us.

3. **Chaetodontoplus melanosoma** Blkr.

Holacanthus melanosoma Bleeker, Nat. Tijdschr. Ned. Indië V, 1853, p. 78. — Acta Soc. Sc. Indo-Neerl. VIII, 1860, p. 12.

Holacanthus dimidiatus Bleeker, Acta Soc. Sc. Indo-Neerl. VIII, 1860, p. 11.

Holacanthus melanosoma Bleeker, loc. cit. p. 12.

Holacanthus melanosoma Günther, Cat. Brit. Mus. II, 1860, p. 55.

Holacanthus melanosoma Bleeker, Versl. Akad. Amsterdam (2) II, (1867) 1868, p. 288.

Holacanthus melanosoma Günther, Brenchley's Cruise of the „Curaçao" 1873, p. 410.

Chaetodontoplus melanosoma Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877. Rev. Chétodont. p. 117. — Arch. Néerl. Sc. Nat. XII, (1876) 1877, p. 22. — Atl. ichth. IX, 1877, p. 57.

Chaetodontoplus dimidiatus Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877 Rev. Chétodont. p. 118. — Arch. Néerl. Sc. Nat. XII, (1876) 1877, p. 23. — Atl. ichth. IX, 1877, p. 57.

Holacanthus melanosoma Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 195.

Holacanthus dimidiatus Fowler & Bean, ibidem.

Holacanthus melanosoma Herre, Notes Fish. Stanford Univ. 1931, p. 61.

Chaetodontoplus melanosoma Fraser-Brunner, Proc. Zool. Soc. London 1933, p. 551.

D. XIII, 17—19; A. III, 17—18. L.r. about 110.

Oval, rostro-dorsal profile more or less convex, height 1.7—2 in length, head 3.4—3.5. Eye 3.4—4 in head, equal to or in adult somewhat smaller than broadly convex interorbital space, shorter than snout. Preorbital entire, hindborder not free; preoperculum with denticulate hindborder, entire below, angular spine as long as eye, interoperculum large, oblong, finely serrate, operculum with minute scales. Snout blunt, mouth oblique, lower jaw prominent. Scales small, without auxiliaries; lateral line arched, terminating at end of dorsal or with a separate portion on caudal peduncle. Spinous dorsal about $^1/_3$ longer than soft; about the four anterior spines graduate, the following subequal, nearly as high as length of head without snout, soft dorsal and anal rounded, third anal spine equal to last dorsal spines. Pectorals rounded, $^2/_3$ of head; ventrals with the first ray scarcely produced, nearly reaching anal, their spine as long as head without snout. Caudal convex. Body dark brown, anteriorly and above somewhat paler, anterior part of head lighter with dark motlings; caudal yellow with large median brown blotch (var. melanosoma Blkr.) or upper half of body and head pale, lower half abruptly dark brown, including caudal peduncle; head with darker markings and vermiculating lines, caudal uniform yellow (var. dimidiatus Blkr.). Length 166 mm. [Types of Bleeker's collection in Leiden Museum seen by us].

Habitat: Solor; Ambon; Misool. Philippines.

Note: Bleeker already noted: „Le *Chaetodontoplus dimidiatus* est fort voisin de *Ch. melanosoma* et je n'y vois d'autre différence, hors les couleurs; que dans les épines dorsales médianes de la dorsale, qui, dans le *melanosoma,* ne sont pas plus longues que les suivantes". This may be a juvenile or a sexual difference. Fowler & Bean call *H. dimidiatus* „very similar to *H. melanosoma* but differs slightly in color". We believe therefore that Fraser-Brunner is right when he says: „There is no doubt whatever that *C. melanosoma* and *dimidiatus* represent one species, being possibly the sexes".

4. **Chaetodontoplus septentrionalis** (Schlegel).

Holacanthus septentrionalis Schlegel, in Temminck & Schlegel, Fauna Japon. Poiss. 1844, p. 82.

Holacanthus septentrionalis Richardson, Ichth. China & Japan, Rep. Brit. Assoc. Cambridge (1845) 1846, p. 246.

Holacanthus chrysocephalus Bleeker, Nat. Tijdschr. Ned. Indië VII, 1854, p. 428.

Holacanthus septentrionalis Bleeker, Acta Soc. Sc. Indo-Neerl. VIII, 1860, p. 78.

Holacanthus septentrionalis Günther, Cat. Brit. Mus. II, 1860, p. 52.

Holacanthus chrysocephalus Günther, loc. cit. p. 54.

Chaetodontoplus chrysocephalus Bleeker, Verh. Akad. Amsterdam (1876) 1877, Rév. Chétodont. p. 115.

Chaetodontoplus septentrionalis Bleeker, Arch. Néerl. Sc. Nat. XII (1876) 1877, p. 35.

Chaetodontoplus chrysocephalus Bleeker, Atl. ichth. IX, 1877, p. 56.

Holacanthus septentrionalis Steindachner & Döderlein, Denkschr. Akad. Wien XLVIII, 1883, p. 24.

Holacanthus septentrionalis Jordan & Snyder, Proc. U. S. Nat. Mus. XXIII, 1901, p. 756.

Holacanthus septentrionalis Jordan & Fowler, Proc. U. S. Nat. Mus. XXV, 1902, p. 545.

Holacanthus ronin Jordan & Fowler, loc. cit. p. 546.

Holacanthus septentrionalis Franz. Abh. Bayer. Akad. IV, Suppl. 1910, p. 50.
Holacanthus septentrionalis Jordan, Tanaka & Snyder, Journ. Coll. Sci. Tokyo XXXIII, 1913, p. 212.
Acanthochaetodon septentrionalis Jordan & Hubbs, Mem. Carnegie Mus. X, 1922—25, p. 253.
Holacanthus septentrionalis Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 193.
Holacanthus chrysocephalus Fowler & Bean, loc. cit. p. 194.
Chaetodontoplus septentrionalis Fraser-Brunner, Proc. Zool. Soc. London 1933, p. 553.
Chaetodontoplus chrysocephalus Fraser-Brunner, loc. cit. p. 554.

D. XIII, 18—19; A. III, 17—19; L.r. about 110.

Oval, strongly compressed, dorsally elevated, ventral profile convex to ventrals, rostro-dorsal profile convex in young, becoming more oblique and steeply ascending with age; height about 1.75 in length, head 3.5—3.7. Eye 3.2 to about 4 in head, 1.2—1.5 in strongly convex interorbital space, situated in anterior half of head, high above horizontal through rather small gape of mouth; snout blunt somewhat longer than eye. Preorbital entire, its hindmargin not free; preoperculum serrated behind, entire below, its angular spine more or less than eye, not grooved; interoperculum large, entire. Nostrils close together, the anterior oval and larger than rounded posterior. Scales small, rough on trunk without auxiliaries, longitudinal series irregular, transverse more regular; on head and median fins minute. Lateral line not conspicuous, concurrent with dorsal profile, extending on caudal peduncle. Spinous dorsal longer than soft, the spines graduate, the last as high as evenly rounded soft dorsal; anal similar, its third spine about equal head without snout. Pectorals rounded, 1.4 in head, ventrals longer with the first ray slightly produced, not reaching anal. Caudal rounded, least height of its peduncle over twice in head. Dark brown, on sides up to 10 narrow bluish black-edged longitudinal bands vermiculated on head and some irregularly continued on dorsal and anal (var. ronin Jordan & Fowler), or they are reduced to 7 or 8 on sides and to few longitudinal stripes running along length of dorsal and anal (var. septentrionalis Schlegel), or the blue stripes are reduced to irregular ones on head and anterior part of trunk and to a longitudinal one on dorsal and two on anal (var. chrysocephalus Bleeker); soft dorsal and anal with a light margin, caudal yellow; base of pectorals crossed by a circular bar. Length 210 mm. [Bleeker's type of chrysocephalus in the Leiden Museum seen by us].

Habitat: Java (Batavia)!. — China, Japan.

Seems to be a very rare species in the Archipelago as there is only one example known from Bleeker's collection.

2. **Pomacanthus** Lacépède.

(Lacépède, Hist. Nat. Poissons IV, 1803, p. 517).
Pomacanthodes Gill, Proc. Acad. Nat. Sc. Philadelphia XIV, p. 244.
Acanthochaetodon Bleeker, Arch. Néerl. Sc. Nat. XII, 1876, p. 308.
Genotype *Chaetodon arcuatus* L.

Ovate or nearly rhomboidal, rostro-dorsal profile more or less convex. Scales on trunk moderate or small, rhombic, rounded or elliptic, more or less unequal, transverse series generally more regular than longitudinal, with or without small basal supplementary scales (auxiliaries), on head small, minute or even velvety to touch, in young often more discernible; lateral line arched, complete, occasionally not reaching caudal. Preorbital without spines, its hindborder not free. Preoperculum with the hindborder finely denticulate, angular spine longer or shorter than eye, grooved or not. Sub- and interoperculum entire or scarcely denticulate. Branchial membrane continuous, usually connected with slender isthmus. Anterior nostril oval, larger than round posterior. Dorsal

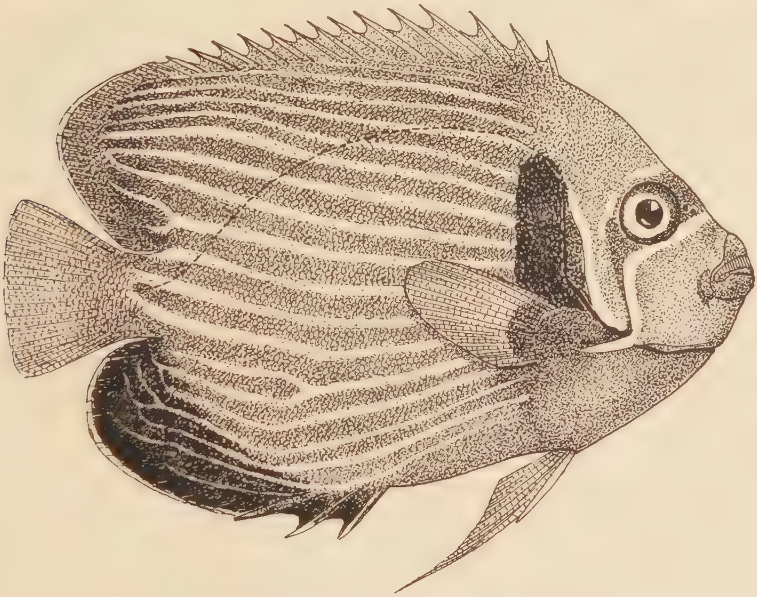

Fig 32. *Pomacanthus imperator* (Bloch), adult × ¾.

XI—XII, 22—25 to XIV, 18—19 or IX—X, 28—30. Spinous dorsal somewhat longer than soft; spines graduate; soft dorsal rounded or produced in adult, its hind margin oblique or vertically truncate, soft anal likewise but usually rounded and less produced. Caudal rounded or truncate. Ventrals with the first ray produced. Young black or dark brown with transverse white and bluish vertical or curved stripes or bars; adult with paler ground colour with longitudinal or vertical bands or dotted or uniformly dull.

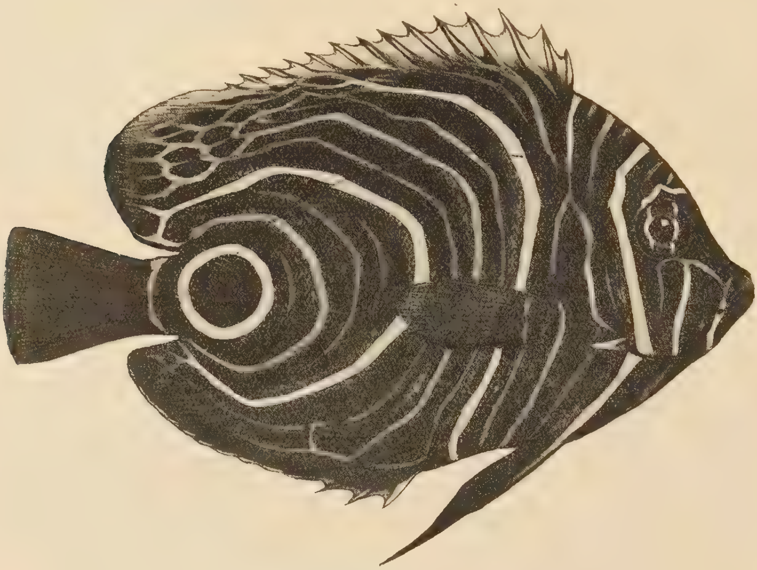

Fig. 33. *Pomacanthus imperator* (Bloch), juvenis, n. s.

Distribution: Marine fishes, attaining a moderate or large size, living in costal water, especially on coral reefs in tropical seas, most numerous in the indo-pacific region.

Methamorphosis of the species of Pomacanthus during Growth.

The identification of some of the species of Pomacanthus is rendered especially difficult by the extraordinary change in colour and in pattern that takes place during their growth and induced to describe them as separate species. A further difficulty arises from the fact that during these changes appears a first stage which is repeated in a resembling way in different species. In this stage the ground colour is almost uniform black or dark blue and crossed by white stripes, in the indo-pacific species with more than four, in the atlantic species and the pacific *zonipectus* with only four transverse stripes between eye and base of caudal. In the indo-pacific species they are successively increasing in number with growth, getting alternately wider and narrower and in *P. striatus* nearly straight, in *P. semicirculatus* curved hindwards Fig. 36. In P. *imperator,* Fig. 33, as recognized by Fraser-Brunner, the stripe nearest the caudal forms usually a complete ring, the preceding curving half way round it, those towards head are straighter. *P. striatus* looses its stripes and finishes as a uniform dark brown adult fish with blackish median fins. *P. semicirculatus* passes through a more complicated and somewhat spotted stage described as *Holacanthus alternans* C. V to a stage with a paler but more spotted ground colour of a quite different appearance and described as *Holacanthus lepidolepis* Blkr. — *P. imperator* is in the adult form still more changed, the transversely striped juvenile stage, described as *nicobariensis* Bl. Schn., transforms in a purplish brown adult fish with numerous longitudinal bands known as *imperator* Bloch. The transversely striped pattern of the juvenile dress of these three species, is in other species of *Pomacanthus* permanently retained but less complete or otherwise altered.

Subgenus **Pomacanthodes** Gill.

Moderately compressed. D. XI—XIV. Soft anal usually not produced in adult. Young black or brown with more than four transverse white or bluish stripes between eye and caudal.

This subgenus inhabits, with the exception of the atlantic *zonipectus* Gill the indo-pacific region and differs from the atlantic subgenus *Pomacanthus* Lacép. which is more compressed, has D. IX—X, 28—30; the soft dorsal and anal both produced in adult; the young with only four transverse white stripes on a blackish ground between eye and caudal.

Key to the adult indo-australian species of Pomacanthodes:

A. With longitudinal more or less oblique stripes on side of body.
  1. 15—25 somewhat oblique stripes. D. XIV, 19—21; A. III, 18—21. D. produced, A. rounded. No auxiliaries or only anteriorly present. L. r. 90 . . . . 1. *imperator* p. 132.

2. Six strongly oblique curved stripes, a humeral blue ring. D. XIII, 21—22; A. III, 20. Hind border of D. truncate, A. rounded. Trunk scales with a basal border of auxiliaries L. r. 70 . . . . 2. *annularis* p. 135.

B. With vertical stripes, dotted or uniformly dull.

1. Scales small, about 80 in L. r. equal, in adult with several auxiliaries. L. l. complete.
    - *a*. D. XI—XII, 22—24; A. III, 21—22. Both fins square with truncate hindborder; C. nearly truncate. Uniformly dark brown . . 3. *striatus* p. 137.
    - *b*. D. XIII—XIV, 18—19; A. III, 19. D. produced, A. rounded, C. rounded. Three broad vertical bars across body, a narrower one between them . . . . 4. *chrysurus* p. 139.
2. Scales unequal, partly moderate, about 75 in L. r. without auxiliaries, L. l. usually complete or not reaching caudal. D. XIII, 21—23; A. III, 20—21. D. produced, A. acute or produced in adult. C. rounded. Sides dotted in adult . . . . 5. *semicirculatus* p. 141.

1. **Pomacanthus (Pomacanthodes) imperator** (Bloch).

(Fig. 32 and 33).

Chaetodon imperator Bloch, Ausl. Fische III, 1787, p. 51.
Chaetodon imperator Gmelin, Linn. Syst. Nat. I, 1789, p. 1255.
Chaetodon imperator Bloch, Schneider, Syst. ichth. 1801, p. 217.
Chaetodon nicobariensis Bloch, Schneider, loc. cit. p. 219.
Holacanthus imperator Lacépède, Hist. Nat. Poiss. IV, 1803, pp. 527, 534.
Holacanthus geometricus Lacépède, loc. cit. pp. 528, 535.
Holacanthus imperator Cuvier & Valenciennes, Hist. Nat. Poiss. VII, 1831, p. 180.
Holacanthus geometricus Cuvier & Valenciennes, loc. cit. p. 189.
Holacanthus imperator Bleeker, Nat. Tijdschr. Ned. Indië III, 1852, p. 758.
Holacanthus nicobariensis Bleeker, Nat. Tijdschr. Ned. Indië VIII, 1855, p. 413.
Holacanthus imperator Günther, Cat. Brit. Mus. II, 1860, p. 52.
Holacanthus nicobariensis Günther, ibidem.
Holacanthus imperator Playfair Fish. Zanzibar 1866, p. 38.
Holacanthus imperator Klunzinger, Verh. Zool. Botan. Ges. Wien XX, 1870, p. 787.
Holacanthus imperator Günther, Brenchley's Cruise „Curaçao" 1873, p. 410.
Holacanthus nicobariensis Günther, ibidem.
Holacanthus imperator Günther, Fische Südsee 1873—75, p. 53.
Holacanthus nicobariensis Günther, loc. cit. p. 54.
Holacanthus imperator Day, Fish. India 4° 1878—1888, p. 112.
Holacanthus imperator Peters, Monatsber. Akad. Berlin 1876, p. 438.
Holacanthus nicobariensis Peters, ibidem.
Acanthochaetodon nicobariensis Bleeker, Verh. Akad. Amsterdam XVII,

(1876) 1877, Rév. Chétodont. p. 148. — Arch Néerl. Sc. Nat. XII (1876) 1877, p. 21. — Atl. ichth. IX, 1877, p. 69.

Acanthochaetodon imperator Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877, Rév. Chétodont. p. 150. — Arch. Néerl. Sc. Nat. XII, (1876) 1877, p. 21. — Atl. ichth. IX, 1877, p. 70. — Arch. Néerl. Sc. Nat. XIII, 1878, p. 45.

Holacanthus nicobariensis Karoli, Termeszetrajzi füzetek. V, 1882, p. 10.

Holacanthus imperator Klunzinger, Fische Roth. Meer 1884, p. 61.

Holacanthus imperator Meyer, Ann. Soc. Española Hist. Nat. 1885, p. 17.

Holacanthus imperator Günther, Proc. Zool. Soc. London 1887, p. 657.

Holacanthus imperator Day, Fish. Brit. India II, 1889, p. 15.

Holacanthus nicobariensis Day, loc. cit. p. 16.

Holacanthus imperator Sauvage, Poissons Madagascar, 1891, p. 515.

Holacanthus nicobariensis Sauvage loc. cit. p. 516.

Holacanthus nicobariensis Boulenger, Ann. Mag. Nat. Hist. (6) XX, 1897, p. 372.

Holacanthus nicobariensis Pellegrin, Bull. Mus. Hist. Nat. IV, 1898, p. 229.

Holacanthus marianas Seale, Occ. Papers Bishop Mus. I, 1901, p. 104.

Holacanthus nicobariensis Seale, loc. cit. p. 105.

Holacanthus bishopi Seale, loc. cit. p. 106.

Holacanthus imperator Jordan & Seale, Bull. U. S. Bur. Fish. XXV, 1906, p. 349.

Holacanthus nicobariensis Jordan & Seale ibidem.

Holacanthus marianas Jordan & Seale ibidem.

Holacanthus bishopi Jordan & Seale ibidem.

Holacanthus marianas Jordan & Dickerson, Proc. U. S. Nat. Mus. XXXIV, 1908, p. 615.

Holacanthus nicobariensis Jordan & Dickerson, ibidem.

Holacanthus bishopi Snyder, Proc. U. S. Nat. Mus. XLII, 1912, p. 422.

Holacanthus bishopi Snyder, loc. cit. p. 510.

Holacanthus nicobariensis M. Weber, Fische Siboga-Exp. 1913, p. 311.

Holacanthus imperator M. Weber, loc. cit. p. 313.

Holacanthus bishopi Jordan, Tanaka & Snyder, Journ. Coll. Sci. Univ. Tokyo, XXXIII, 1913, p. 212.

Holacanthus nicobariensis Ogilby, Mem. Queensland Mus. III, 1915, p. 100.

Holacanthus imperator Ogilby loc. cit. p. 108.

Holacanthus nicobariensis Jordan & Starks, Ann. Carnegie Mus. XI, 1917, p. 458.

Holacanthus nicobariensis Barnard, Ann. S. African Mus. XXI, 1925—27, p. 615.

Holacanthus imperator Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 97.

Holacanthus nicobariensis Herre & Montalban, loc. cit. p. 98.

Holacanthus nicobariensis Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 262.

Holacanthus imperator Fowler, loc. cit. p. 263.

Holacanthus nicobariensis Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 188.

Holacanthus imperator Fowler & Bean, loc. cit. p. 189.

Holacanthus nicobariensis Pillay, Journ. Bombay Nat. Hist. Soc. XXXIII, 1929, p. 368.

Holacanthus nicobariensis Herre, Journ. Pan-Pacific Res. Inst. VI, 1931, p. 13.

Holacanthus imperator, Herre, Notes Fish. Stanford Univ. 1931, p. 61. — Journ. Pacific Res. Inst. VII, 1932, p. 4.

Pomacanthus (Pomacanthodes) imperator Fraser-Brunner, Proc. Zool. Soc. London 1933, p. 556.

D. XIV, 19—21; A. III, 18—21; L. r. about 90.

Oval, rather robust; height in adult 1.6—1.8, head 3.6—4 in length; rostro-dorsal profile slightly convex, in full grown examples somewhat concave to straight before eye. Eye 3.6—4 in middle of head, far above horizontal through gape of mouth, equal to, in adult much smaller than broadly convex interorbital space and likewise to blunt snout. Posterior nostril oval, slightly larger than round anterior. Preoperculum finely serrate, the angular spine somewhat shorter or much longer than eye, according to age (and sex?) inter- and suboperculum entire. Scales on trunk moderate, rounded, in anterior part of trunk in old specimens mixt with a few irregular smaller ones [1]), no true basal auxiliaries present; the longitudinal series irregularly arranged, the vertical ones more regularly; on head minute, badly discernible to velvety; lateral line strongly arched, complete. Spinous dorsal about $^2/_5$ longer than soft, the spines graduate, the last 1.5—1.7 in head; soft dorsal rounded, in old somewhat acutely produced; soft anal rounded, its third spine about equal to head without snout. Pectorals slightly shorter than head to equal; ventrals longer, the first ray being prolonged and nearly reaching anal, its spine longer or shorter than head. Caudal convex, least heigth of its peduncle 2—2.5 in head. Colour pattern quite different below or above about 100 mm length, with transitional stages. In the definite pattern the general colour is purplish brown with a black patch above pectoral extending on chest and throat, from this black area numerous yellow bands run obliquely upwards to dorsal fin and backwards to tail and anal; in adult a brownish band originates on interorbital space, crosses eye and curves down along preopercular border to angular spine, anal with longitudinal bands, caudal and paired fins yellowish. The about 25 yellow bands may be reduced to about 15 in younger specimens, who have a network of blue lines on anal and bluish lines on head and chest.

The younger *(nicrobariensis)* of more or less than 100 mm. length are black, becoming paler with age, with concentric streaks part white part blue on trunk, the last forming a usually complete white ring before tail and blue irregular lines on head and chest; soft dorsal and anal with vermiculated lines, first disappearing on dorsal while the longitudinal yellowish band of the adult begin to appear (= marianas Seale).

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[1]) This may be the reason that Bleeker calls the scales: „trunco antice aetate provectis plus minusve squamulatis, trunco medio et postice non squamulatis." Herre & Montalban call the „accessory scales pretty evenly distributed over body", our specimens don't show that.

Habitat: Singapore; Pulu Weh!; Adonare!; Timor; Celebes (Makassar!, Menado); Ambon!; Ceram; Banda!; Aru Is. (Dobo!); Waigeu; Misol; New Guinea. — Red Sea, Zanzibar, Mozambique, Mauritius, Madagascar, Muscat, British India, Ceylon, Nicobars, China, Japan (Miauki, Sagami), Okinawa, Philippines, Queensland, Melanesia, Micronesia, Polynesia to Tahiti.

Note: Fraser-Brunner was the first to recognize the identity of *nicobariensis* Bloch, Schneider with *imperator* and to illustrate the transformation on a beautiful plate. The identity of *marianas* Seale with *imperator* and of *bishopi* Seale with *nicobariensis* was already shown by Fowler 1928, so that these four nominal species together with *geometricus* Lacépède are to be united as different stages of development of *imperator*.

2. **Pomacanthus (Pomacanthodes) annularis** (Bloch). (Fig. 34).

Chaetodon annularis Bloch, Ausl. Fische III, 1787, p. 114.
Chaetodon annularis Gmelin, Syst. nat. Linn. I, 1789, p. 1262.
Holacanthus annularis Lacépède, Hist. nat. Poiss. IV, 1803, pp. 526, 533.
Chaetodon annularis Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 178.
Holacanthus septentrionalis Richardson, Rep. Ichth. China and Japan, Brit. Assoc. 1846, p. 246. (p. parte).
Holacanthus annularis Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3) II, 1845, p. 520. — Verh. Batav. Gen. XXIII (1849) 1850, p. 26.
Holacanthus annularis Cantor, Cat. Malay Fishes 1850, p. 1146.
Holacanthus annularis Rüppell, Samml. Senckenberg. Mus. 1852, p. 10.
Chaetodon verticosus Gray, Cat. Fish. Gronow II, 1854, p. 74.
Holacanthus pseudannularis Bleeker, Nat. Tijdschr. Ned. Indië XV, 1858, p. 170.
Holacanthus annularis Günther, Cat. Brit. Mus. II, 1860, p. 42.
Acanthochaetodon annularis Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877, Rév. Chétodont. p. 152. — Arch. Néerl. Sc. Nat. XII (1876) 1877, p. 21. — Atl. ichth. IX, 1877, p. 170.
Holacanthus annularis Day, Fish. India 4°, 1878—1888, p. 112. — Fish. Brit. India II, 1889, p. 16.
Holacanthus annularis Duncker, Mitth. Naturh. Mus. XXI, 1904, p. 151.
Holacanthus annularis M. Weber, Abh. Senckenberg. Naturf. Ges. XXXIV, 1911, p. 31.
Acanthochaetodon annularis Bean & Weed, Proc. U. S. Nat. Mus. XLII, 1912, p. 607.
Holacanthus annularis Pillay, Journ. Bombay Nat. Hist. Soc. XXXIII, 1929, p. 368.

Holacanthus annularis Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 191.

Pomacanthus (*Pomacanthodes*) *annularis* Fraser-Brunner, Proc. Zool. Soc. London 1933, p. 559.

Acanthochaetodon annularis Delsman & Hardenberg, Indische Zeevisschen 1934, p. 270 (titleplate).

D. XIII, 21—22; A. III, 20—21; L. r. ca 70.

Ovate, posteriorly elevated, height 1.5—1.6; head 3.5 to more than 4 in adult; rostro-dorsal profile straight to nape thence convex to dorsal. Eye 3.5 to 4.3, high above horizontal through gape of mouth, more or less than twice in broadly convex interorbital space, much less than blunt snout. Anterior nostril oval, twice longer than round posterior. Preorbital slightly denticulate; hind and lower border of preoperculum weakly serrate, its angular spine grooved or slightly triquetrous, even in adult of very variable length (sexually?), 2.4—4 in head, at most reaching to below middle of base of pectoral; interoperculum and suboperculum entire. Scales on trunk moderate, rounded, with several auxiliaries forming a basal rim, subequal, horizontally in sowewhat irregular

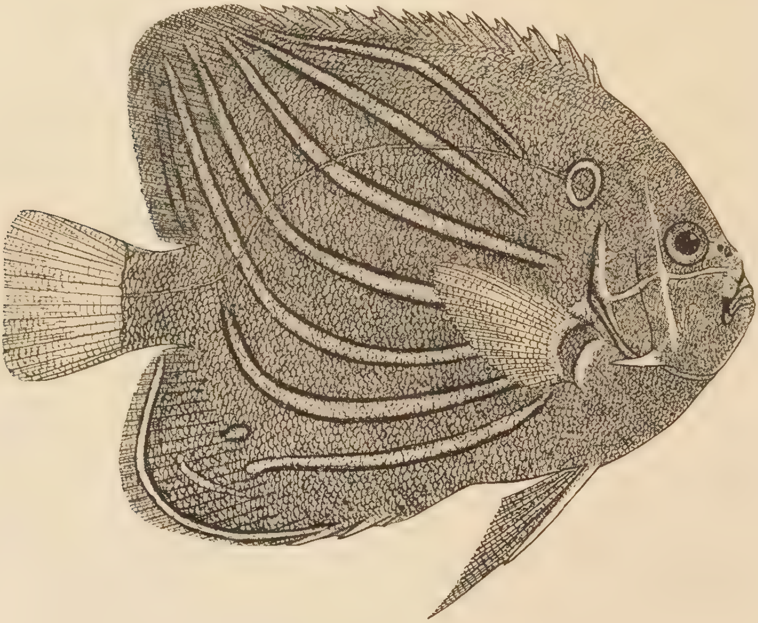

Fig. 34. *Pomacanthus (Pomacanthodes) annularis* (Bloch) × 3/5.

series, the vertical series more regularly arranged; on head velvety, minute on chest and median fins; lateral line arched, complete. Dorsal spines graduate, soft dorsal acute, in adult the five or six anterior rays sometimes acutely produced, the line arched, complete. Dorsal spines graduate, soft dorsal acute, in adult the five or six anterior rays sometimes acutely produced, the hindborder vertical, likewise the soft anal, which is otherwise obliquely rounded; third anal spine equal to or slightly shorter than head. Pectorals acutely rounded, equal to or sowhat shorter than head; ventrals with the first ray prolonged, equal to or conspicuously longer than head, reaching anal, their spine about as long as head without snout. Caudal bluntly rounded, least height of its peduncle about twice in head. Yellowish or grayish brown, trunk scales with a darker centre, five to seven curved blue lines radiating from pectoral to soft dorsal, the last one crossing the tail, two similar horizontal lines running from front to operculum, the superior crossing the eye, the inferior below it, base of pectoral with transverse lines; caudal and pectorals yellow, ventrals grayish, on the shoulder a somewhat irregular blue ring.

Length up to 373 mm.

Nom. indig.: Kambing (Malay, Batavia).

Habitat: Singapore!; Penang, Sumatra (Telok Betong); Java (Batavia!; Tjilatjap); Celebes (Makassar); Adonare!; Aru Isl. (Dobo!); New Guinea!. — British India, Ceylon.

3. **Pomacanthus (Pomacanthodes) striatus** (Rüpp.).

?*Holacanthus coeruleus* (Ehrenberg) Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1832, p. 194.
Holacanthus striatus Rüppell, Neue Wirbelth. Fische 1835, p. 32.
Holacanthus striatus Rüppell, Samml. Senckenberg, Mus. 1852, p. 10.
Holacanthus semicirculatus Bleeker, Nat. Tijdschr. Ned. Indië III, 1852, p. 452. (nec C. V.).
Holacanthus striatus Bleeker, Nat. Tijdschr. Ned. Indië VIII, 1855, p. 414.
Holacanthus striatus Günther, Cat. Brit. Mus. II, 1860, p. 53.
Holacanthus astur var. *a* Klunzinger, Verh. Zool. Botan. Ges. Wien XX, 1870, p. 789. (nec synon.).
Holacanthus striatus Kossmann & Räuber, Verh. Naturh. Med. Verein Heidelberg I, 1876, p. 20.
Acanthochaetodon striatus Bleeker, Arch. Néerl. Sc. Nat. XII, 1876, pp. 21, 25. — Verh. Akad. Amsterdam XVII (1876) 1877, Rév. Chétodont. p. 145. — Atl. ichth. IX, 1877, p. 68.
Holacanthus striatus Karoli, Termeszetrajizi füzetek V, 1882, p. 10.
Holacanthus coeruleus Klunzinger, Fische Roth. Meer, 1884, p. 61. (p. parte).
Holacanthus striatus Sauvage, Poiss. Madagascar, 1891, p. 516.
Holacanthus rhomboides Gilchrist & Thompson, Ann. South African Mus. VI, 1908, p. 161.

Holacanthus rhomboides Regan, Ann. Durban Mus. I, 1916, p. 169.
Holacanthus striatus Norman, Ann. Mag. Nat. Hist. (9) IX, 1922, p. 321.
Holocanthus striatus Barnard, Ann. South African Mus. XXI, 1925—27, p. 616.
Holacanthus semicirculatus p. parte Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 186, fig. 9 (middle left hand example) .
Pomacanthus (Pomacanthodes) striatus Fraser-Brunner, Proc. Zool. Soc. London, 1933, p. 560.

D. XIII, 22—24; III, 21—22; L. r. about 80.

Oval, dorsal profile more convex than ventral, rostro-dorsal profile evenly convex, height 1.5—1.6, head more or less than 3.50 in length. Eye nearly 4 in adult, in middle of head, far above horizontal through gape of mouth, slightly shorter than convex interorbital space and much shorter than snout; mouth opening small, curved. Anterior nostril oval, larger than round posterior. Preorbital entire, its hind margin not free, preoperculum with the hind border finely serrate, the lower with few minute spines; the angular spine small, about five times in head; interoperculum and suboperculum entire. Scales on trunk small, subequal, dorso-ventrally elliptic, very rough, in adult with auxiliaries, longitudinal series somewhat irregularly arranged, transverse series less so, on head, chest and median fins minute but discernible and not velvety; [1]) lateral line strongly arched, complete. Spinous dorsal about the distance of the three anterior spines longer than soft; spines graduate, the last the longest, about 1.7 in head. The six anterior dorsal rays the longest, thence rapidly decreasing, forming a vertically truncate hindborder of the fin; soft anal likewise, but slightly less truncate, third anal spine about equal to last dorsal. Pectorals shorter than head; ventrals acute, the first ray prolonged, reaching third anal spine, ventral spine equals about head without snout. Caudal nearly truncate, least height of its peduncle about 2.4 in head. Colour in adult spirit examples dark uniform brown, trunk scales with a darker centre, median fins blackish. Young with about 15 alternately broad or narrow white transverse nearly straight bands, abruptly curved when entering dorsal and anal. Length up to 290 mm.

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[1]) There is much disparity in the description of the squamation. Bleeker says about the scales „trunco non squamulatis", Barnard: „large and small ones intermixed". Fraser-Brunner calls them „with several auxiliaries at base" as also depicted in his text (figure 2). Our specimen of 110 mm length lacks them. Mr. Fraser-Brunner who was so kind to examine our specimen, declares our identification correct and the abscence of auxiliaries due to the fact that the specimen is young, as also Bleeker's account is that of a young fish, the adult being unknown at that time, while the „small scales" described by Barnard, are the auxiliaries.

Habitat: Singapore; Banka; Sumatra; Borneo; Ambon!. — Red Sea, Natal coast, Madagascar.

Note. Fraser-Brunner has placed *Chaetodon microlepis* Bleeker (Nat. Tijdschr. Ned. Indië IV, 1853, p. 257) in the synonymy of *Pomacanthus* (*Pomacanthodus*) striatus (Rüppell). We feel more inclined to unite it with *Pomacanthus (Pomacanthodes) semicirculatus* C. V. as Bleeker did.

4. **Pomacanthus (Pomacanthodes) chrysurus** (C.V.) (Fig. 35).

Holacanthus chrysurus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 188.
Holacanthus chrysurus Peters, Monatsber. Akad. Berlin 1855, p. 438 (name).
Holacanthus chrysurus Günther, Cat. Brit. Mus. II, 1860, p. 54.
Holacanthus chrysurus Playfair, Fish. Zanzibar, 1866, p. 38.
Holacanthus chrysurus Sauvage, Poissons Madagascar 1891, p. 262.
Holacanthus chrysurus Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 158.
Pomacanthus (*Pomacanthodes*) *chrysurus* Fraser-Brunner, Proc. Zool. Soc. London 1933, p. 558.

This species is described by the latest author, Fraser-Brunner, from specimens from the East-coast of Africa, the only habitat known, as follows:

„Depth of body 1 $^2/_3$ in length, head $3^2/_3$ to 4; eye $3^1/_3$ to 4 in head, 1 $^1/_2$ in interorbital width. Preorbital finely dentate below. Preoperculum finely denticulate behind, a few minute spines below, the spine at the angle 4 tot 5 $^1/_2$ in head, not grooved. Interoperculum large, entire. Opercular scales very small; scales on head and cheek velvety. Lateral line complete. Scales small about 80 [1]) in lateral line, roughly equal, each with several auxiliaries at base. Dorsal XIII or XIV, 18—19, the soft fin somewhat produced; anal III, 19, the soft fin rounded. Pectoral as long as head. Pelvics reaching beyond origin of anal. Caudal rounded. Brown, three broad vertical bars across body, bent abruptly above to extend obliquely backwards across dorsal fin, each broadly bordered with black; between each of these bars a much narrower one. A narrower bar across tail extending on to dorsal and anal and one from nape to behind eye. A blue stripe connecting the eyes and two deep blue stripes passing obliquely forwards across cheek. Pectorals and pelvics brown; caudal yellow. Immature form similar, but with head striped as in young P. imperator 140—195 mm. long."

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[1]) Sauvage mentions only 60 scales.

We have copied this latest diagnosis from Fraser-Brunner, notwithstanding the species is only known from the tropical East-coast of Africa, as we are of opinion, that a young Pomacanthus of 89 mm. length in juvenile dress, caught by the Siboga-Expedition on a coral reef near Elat, Kei Islands, with the following diagnosis, belongs to it: Oval, rostro-dorsal profile steeply ascending to nape, thence curved to dorsal; height 1.7, head 3.5 in length. Eye 3 in head, situated in its anterior half, slightly shorter than somewhat convex interorbital space, longer than blunt snout, far above horizontal through gape of mouth. Preorbital nearly entire, preoperculum scarcely denticulate, the angular spine shorter than eye, grooved. Scales on trunk small, about 60 from opercle to caudal, conspicuously rhombic, without basal auxiliaries, on head minute but discernible, not velvety, on opercle somewhat larger; lateral line complete. Spinous dorsal about three spines longer than soft, spines graduate, the last half of head; XIII, 19, soft

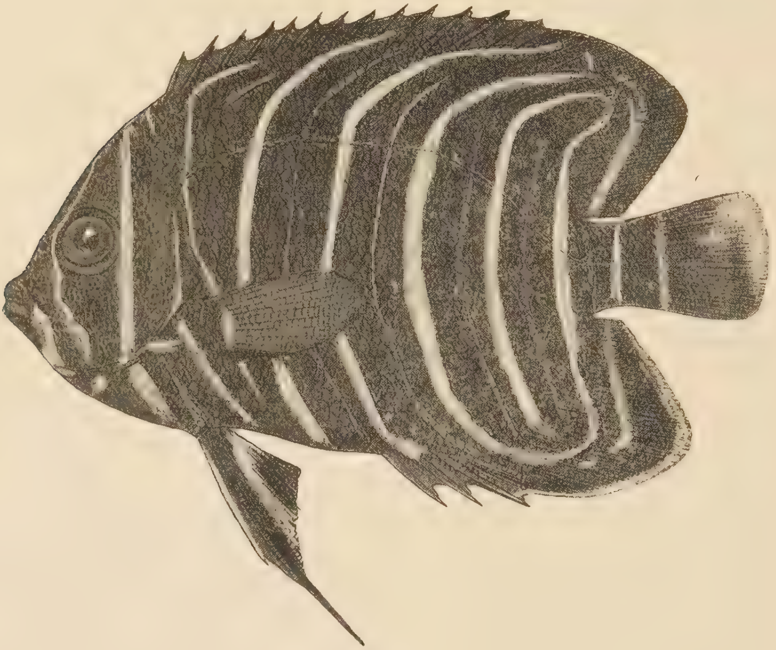

Fig. 35. *Pomacanthus (Pomacanthodes) chrysurus* (C. V.) juvenis. × ¾.

dorsal somewhat produced. Anal III, 19, more obtusely rounded; third ventral spine equal to last dorsal spine. Pectorals nearly equal head; ventrals with the first ray strongly prolonged, reaching to third anal spine. Caudal rounded, least height of its peduncle nearly half length of head. Comparing the coloration with that of semicirculatus of nearly equal size, the stripes on the head are about equal but the vertical white bars on the body are quite different: they are nearly straight and abruptly bent on dorsal and somewhat continued on that fin, less so on anal, similar to the young of striatus, but much less numerous, more like figure 6 of chrysurus by Fraser-Brunner. But our specimen being half size smaller, shows a still more juvenile stage, with more uniform ground colour, with 5 vertical white bars, 3 of which the widest and between them a much narrower blue one, the last from dorsal to anal across the tail, which besides is crossed by 2 further ones and a faint one on caudal, only the posterior half of that fin is already bleached.

Our specimen differs furthermore from semicirculatus by the less numerous dorsal and anal rays, the much steeper rostro-dorsal profile, the more forward position of the eye, the larger, rhombic and less numerous scales.

5. **Pomacanthus (Pomacanthodes) semicirculatus** (C.V.).
(Fig. 36 and 37).

Holacanthus semicirculatus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 191.
Holacanthus alternans Cuvier & Valenciennes, loc. cit. p. 193.
Holacanthus coeruleus Cuvier & Valenciennes, loc. cit. p. 194.
Holacanthus semicirculatus Lesson, Voy. „Coquille" Poiss. II, (1830) 1831, p. 173.
Holacanthus microlepis Bleeker, Nat. Tijdschr. Ned. Indië IV, 1853, p. 257.
Holacanthus lepidolepis Bleeker, Nat. Tijdschr. Ned. Indië IV, 1853, p. 468.
Holacanthus semicirculatus Peters, Monatsber. Akad. Berlin, 1855, p. 438.
Holacanthus semicirculatus Montrouzier, Ann. Sc. phys. Soc. d'Agricult. Lyon (2) VIII, 1856, p. 447.
Holacanthus iburu Montrouzier, ibidem.
Holacanthus lepidolepis Günther, Cat. Brit. Mus. II, 1860, p. 47.
Holacanthus semicirculatus Günther, loc. cit. p. 53.
Holacanthus alternans Guichenot, Mém. Soc. Sc. nat. Cherbourg XII, 1866, p. 145.
Holacanthus alternans Playfair, Fish. Zanzibar, 1866, p. 38.
Holacanthus semicirculatus Playfair, ibidem.
Holacanthus ignatius Playfair Proc. Zool. Soc. London, 1867, p. 852.
Holacanthus poecilus Peters, Monatsber. Akad. Berlin (1868) 1869, p. 454.
Holacanthus caerulescens Klunzinger, Verh. Zool. Botan. Ges. Wien, XX, 1870, p. 790.

Holacanthus alternans Bleeker, Enum. Poiss. Madagascar, 1875, p. 96.
Holacanthus lepidolepis Bleeker, ibidem.
?*Holacanthus caerulescens* Kossmann & Räuber, Verh. Natuurh. Med. Verein. Heidelberg I, 1876, p. 21.
Holacanthus alternans Peters, Monatsber. Akad. Berlin, 1876, p. 832.
Acanthochaetodon lepidolepis Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877, Rév. Chétodont. p. 143. — Arch. Néerl. Sc. Nat. XII, (1876) 1877, p. 21. — Atl. ichth. IX, 1877, p. 67.
Acanthochaetodon semicirculatus Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877. Rév. Chétodont. p. 146. — Arch. Néerl. Sc. Nat. XII, (1876) 1877, p. 21. — Atl. ichth. IX, 1877, p. 69.
Acanthochaetodon alternans Bleeker, Arch. Néerl. Sc. Nat. XII (1876) 1877, p. 27.
Holacanthus lepidolepis Lunel, Mém. Soc. Phys. Nat. 18881, p. 270.
Holacanthus alternans Lunel, loc. cit. p. 271.
Holacanthus lepidolepis Karoli, Termeszetrajizi füzetek V, 1882, p. 10.
Holacanthus semicirculatus Macleay, Proc. Linn. Soc. N. S. Wales VIII, 1883, p. 263.
Holacanthus coeruleus Klunzinger, Fische Roth. Meer, 1884, p. 61.
Holacanthus semi-circularis De Vis, Proc. Linn. Soc. N. S. Wales IX, 1884, p. 457.
Holacanthus semicirculatus Meyer, Ann. Soc. Española Hist. Nat. XIV, 1885, p. 18.
Holacanthus ignatius Sauvage, Poiss. Madagascar 1891, p. 265.
Holacanthus reginae Sauvage, loc. cit. p. 268.
Holacanthus alternans Sauvage, loc. cit. p. 269.
Holacanthus lepidolepis Sauvage, loc. cit. p. 515.
Holacanthus semicirculatus Pfeffer, Jahrb. Hamburg. wiss. Anstalt. X, 1893, p. 9.
Holacanthus semicirculatus var. *alternans* Pfeffer, ibidem.
Holacanthus alternans var. *meleagris* Alcock, Journ. Asiat. Soc. Bengal LXV, 1896, p. 303.
Holacanthus alternans Alcock, loc. cit. p. 312.
Holacanthus semicirculatus Jatzow & Lenz, Abh. Senckenberg. Nat. Ges. XXI, 1899, p. 503.
Holacanthus lepidolepis Steindachner, Denkschr. Akad. Wien LXXI, 1902, p. 139.
Holacanthus semicirculatus Jordan & Seale, Bull. U. S. Bur. Fish. XXV (1905) 1906, p. 349.
Holacanthus alternans Jordan & Seale, ibidem.
Holacanthus lepidolepis Snyder, Proc. U. S. Nat. Mus. XLII, 1912, p. 510.
Holacanthus semicirculatus M. Weber, Fische Siboga-Exp. 1913, p. 311.
Holacanthus semicirculatus de Beaufort, Bijdr. Dierk. 1913, p. 125.
Holacanthus alternans Pellegrin, Bull. Soc. Zool. France XXXIX, 1914, p. 227.
Holacanthus semicirculatus Pellegrin, ibidem.
Holacanthus semicirculatus Ogilby, Mem. Queensland Mus. III, 1915, p. 110.
Holacanthus alternans Regan, Proc. Zool. Soc. London 1918, p. 193.
Holacanthus semicirculatus Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 100.
Holacanthus lepidolepis Herre & Montalban, loc. cit. p. 103.
Holacanthus semicirculatus Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 262.

Holacanthus lepidolepis Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 184.
Holacanthus semicirculatus Fowler & Bean, loc. cit. p. 185.
Holacanthus semicirculatus Herre, Notes Fish. Standford Univ. 1931, p. 61. — Pan-Pacific Res. Insit. VI, 1931, p. 13.
Holacanthus lepidolepis Herre, Notes Fish. Stanford Univ. 1931, p. 61.
Holacanthus (Acanthochaetodon) semicirculatus Whitley, Rep. Great Barrier Reef, Exp. IV, 1932, p. 288.
Pomacanthus (Pomacanthodes) semicirculatus Fraser-Brunner, Proc. Linn. Soc. London, 1933, p. 563.

D. XIII, 21—23; A. III, 20—21; L.r. ca 75.

Oval, height 1.5—1.7, head 3.3—4 in length, rostro-dorsal profile in adult obliquely ascending in a nearly straigth line to nape thence convex to dorsal, in young totally more convex. Eye about in middle of head, far above horizontal through gape of mouth, 2.75—3 in young, more than 3—4 in adult, about equal to or less than nearly flat interorbital space; snout blunt slightly longer than head. Anterior nostril oval, larger than rounded posterior. Preorbital convex, below finely dentate; hindborder of preopercle finely serrate, lower border scarcely so, angular spine equal to or somewhat longer or shorter than eye; inter- and subopercle nearly

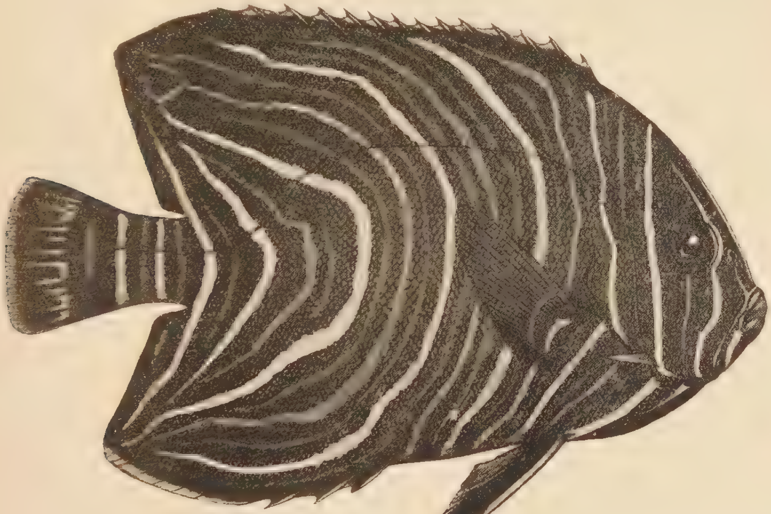

Fig. 36. *Pomacanthus (Pomacanthodes) semicireulatus* (C.V.) juvenis, × $^9/_{10}$.

entire. Scales on trunk moderate, unequal, without auxiliaries [1]), longitudinal and transverse series irregular; on head velvety, on chest and median fins minute; lateral line arched, complete or incomplete near caudal. Spinous dorsal slightly longer than soft; spines graduate, the last longer than head without snout, in young somewhat shorter; soft dorsal in young obtusely rounded, later angulate and finally in adult acute with fifth, sixth and seventh ray more or less produced; anal with similar changes in its rayed part but usually less pronounced, third anal spine about as long as last dorsal; hindmargin of soft dorsal and anal initially bluntly rounded getting truncate with growth. Pectorals not much shorter than head; ventrals acute, the first ray prolonged, reaching anal. Caudal rounded, least height of its peduncle much longer than eye. The development of colour and pattern with growth, first recognized by Regan (1918), are shortly described on page 131; the final adult stage, by Bleeker described as lepidolepis (Fig. 37), is yellowish in its anterior, greyish or brownish in its posterior half, the sides irregularly mottled with dark spots, lighter on soft dorsal,

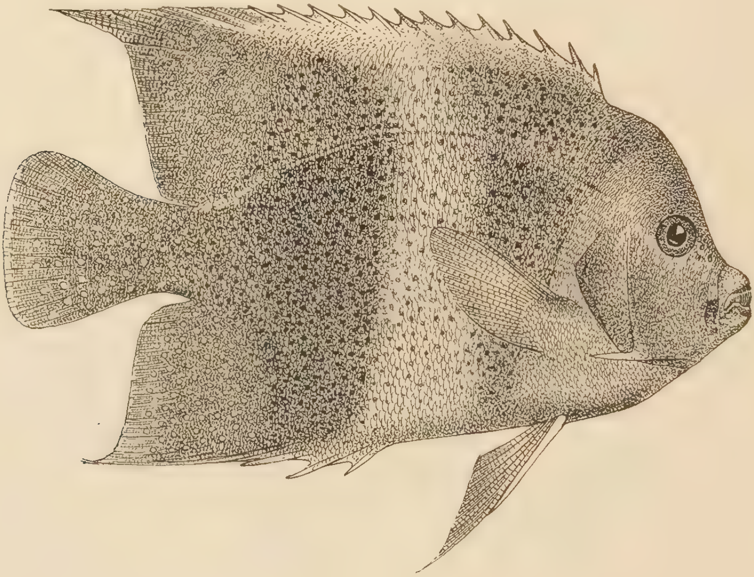

Fig. 37. *Pamocanthus (Pomacanthodes) semicirculatus* (C.V.) adult, × ½.

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[1] Bleeker calls them „valde squamulatis" in *P. lepidolepis* (Blkr.); this is the adult stage and his figure shows conspicuously basal auxiliaries.

anal and caudal; paired fins yellowish, ventrals with a blue hue. Length up to 326 mm.

Habitat: Singapore!; Banka; Pulu Weh!; Sumatra (Kauer, Benkulen, Priaman); Java (Patjitan, Karangbollong, Anjer, Batavia); Lombok!; Flores!; Rotti!; Timor; Kisser!; Celebes (Menado, Gorontalo); Saleyer!; Ambon!; Buru; Ceram; Waigeu!; Goram Archip.; New Guinea!. — Red Sea, Aden, Sokotra, Zanzibar, East-Africa (Kokotomi), Mozambique, Mauritius, Madagascar, Seychelles, Ceylon (Palk Straits), China (Karoli); Okinawa (Snyder), Philippines, Engineer Group, Queensland, Woodlark, New Hebrides, New Britannia, New Ireland, Bismarck Archip., Samoa.

Note: *Holacanthus ignatius* Playfair, cited in our synonymy, makes the impression of a geographical race inhabiting Madagascar and Seychelles, by the strong elongation of some of the dorsal and anal rays, especially the last named much longer than in *semicirculatus* and, together with the elongated dorsal rays, far surpassing end of caudal; this impression is fortified by the indication of both Playfair and Sauvage, that the anal rays count only ten (*semicirculatus* at least 20); but this statement seems erroneous as their figures show at least 20 rays.

3. **Euxiphipops** Fraser-Brunner [1]).

(Fraser-Brunner, Copeia 1934, no. 4, p. 192).
Heteropyge Fraser-Brunner, Zool. Soc. London, 1933, p. 569.
Genotype: *Holacanthus xanthometopon* Blkr.

More or less ovate, scales on trunk ctenoid, rather large, about 50 in linea recta, with radiating striae or somewhat spinulose, without auxiliaries; on head minute or small, on cheeks irregular and unequal; lateral line complete. Interorbital space greater than eye in adult. Preorbital with the lower margin entire or feebly dentate, the hindmargin not free; preoperculum serrate behind, the lower border with a few strong spines, angular spine grooved, longer than eye; interoperculum large, entire. Nostrils close together, rounded, about equal. Teeth slender, long, in brushlike series, present on vomer. Spinous dorsal conspicuously longer than soft; spines XII—XIV, graduate; soft dorsal and anal rounded or cuneiform, in one species much produced. Pectorals acutely rounded, not much shorter than head, ventrals with much elongated first ray, reaching about soft anal. Caudal rounded.

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[1]) The generic name *Heteropyge* had to be changed in *Euxiphipops* by Fraser-Brunner in Copeia 1934, p. 192, as it was preoccupied in Myriapoda.

Distribution: Marine, littoral, gaudy coloured fishes attaining the largest size in Pomacanthinae. One species with much produced dorsal and anal (subgenus *Arusetta* Fraser-Brunner) is restricted to the Red Sea; those with rounded dorsal and anal (subgenus *Heteropyge* Fraser-Brunner) centre in the Indo-Australian Archipelago and extend to Australia, the Pelew Ild., Solomons and Ponape.

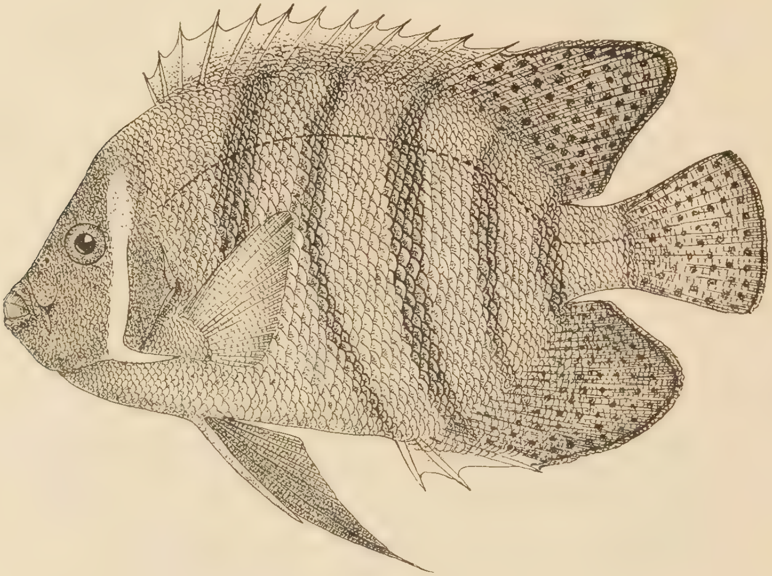

Fig. 38. *Euxiphipops sexstriatus* (C.V.) × ½.

Key to the indo-australian species of *Euxiphipops*.

1. Sides of body with six or seven transverse dark bars, a white one on head behind eye . . . . 1. *sexstriatus* p. 146.
2. No transverse bars on body.
   - *a.* Brownish, head darker with paler markings besides a pale interorbital patch including eye and nostrils, a black ocellus at base of last dorsal ray . . . . 2. *xanthometopon* p. 148.
   - *b.* Yellowish, a bluish curved stripe from upper-lip to behind ventral, an other from spinous dorsal to near vent, the open space between blackish, a similar patch across tail and anal 3. *narvarchus* p. 149.

1. **Euxiphipops sexstriatus** (C.V.). (Fig. 38).

Holacanthus sexstriatus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 194.

Holacanthus sexstriatus Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3) II, 1845, p. 520. — Verh. Batav. Gen. XXIII (1849) 1850, p. 25. — Acta Soc. Sc. Indo-Neerl. VIII, 1860, p. 35.
Chaetodon resimus Gray, Cat. Fish. Gronowius, 1854, p. 71.
Holacanthus sexstriatus Günther, Cat. Brit. Mus. II, 1860, p. 49.
Holacanthus sexstriatus Kner, Fische Novara-Exp. 1865, p. 104.
Holacanthus sexstriatus Steindachner, Sitzber. Akad. Wien LX, 1869, p. 561.
Holacanthus sexstriatus v. Martens, Preuss. Exp. Ost-Asien 1876, p. 323.
Holacanthus sexstriatus Alleyne & Macleay, Proc. Linn. Soc. N. S. Wales, 1876, p. 277.
Holacanthus sexstriatus Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877, Rév. Chétodont. p. 140. — Atl. ichth. IX, 1877, p. 66.
Holacanthus sexstriatus Macleay, Proc. Linn. Soc. N. S. Wales II, 1878, p. 352. — Descr. Cat. Austral. Fish. I, 1881, p. 95. — Proc. Linn. Soc. N. S. W. VII, 1882, p. 244.
Holacanthus sexstriatus Karoli, Termeszetrajzi füzetek V, 1882, p. 10.
Holacanthus sexstriatus Meyer, An. Soc. Española, Hist. Nat. XIV, 1885, p. 18.
Holacanthus sexstriatus Duncker, Mitth. Naturh. Mus. Hamburg XXI, 1904, p. 151.
Holacanthus sexstriatus Ogilby, Mem. Queensland Mus. III, 1915, p. 105.
Holacanthus sexstriatus Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 84.
Holacanthus sextriatus Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 260.
Holacanthus sexstriatus Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 177.
Holacanthus sexstriatus Herre, Journ. Pan-Pacific Res. Inst. VI, 1931, p. 7.
Holacanthus sexstriatus Whitley, Rep. Great. Barrier Reef IV, 1932, p. 258.
Heteropyge sexstriatus Fraser-Brunner, Proc. Zool. Soc. London, 1933, p. 569.
Euxiphipops sexstriatus Fraser-Brunner Copeia 1934, n° 4, p. 192.

D. XIII, 18—20; A. III, 18—19; L.r. about 50.

Longitudinal-oval, compressed, rostro-dorsal profile obliquely ascending in a nearly straight, somewhat sinuous line, snout blunt, prominent; height 1.7—1.8 in length, head 3.2 to nearly 4. Eye 3 to more than 4 in head according age, about twice in snout, 1.5 in convex interorbital space, situated about midway head, far above horizontal through gape of mouth, which is oblique, the lower jaw projecting. Teeth long, equal, vomerine teeth present. Preorbital entire or feebly dentate, hindmargin not free; preoperculum densely serrate behind, below with few strong spines, the angular spine strongly grooved, in adult more than twice in head; interoperculum large, entire. Nostrils close together, rounded, nearly equally wide. Scales on trunk rather large, feebly ctenoid, rhombic, somewhat spinulose, no auxiliaries; on head, chest and median fins smaller, on cheeks irregular, unequal, not spinulose, on operculum in about eight irregular vertical rows. Spinous dorsal longer than soft, the spines graduate, the last 1.2—1.5 in head; soft dorsal cuneiform, its hindborder obliquely truncate, sixth and seventh ray longest, anal of similar form, its third spine somewhat shorter than last dorsal spine. Pectorals acutely rounded, somewhat shorter than head; ventrals with the first ray prolonged reaching to soft anal, the spine slightly shorter than head. Caudal rounded, least height of its peduncle almost twice in head. Colour in alcohol yellowish or brownish, trunk scales with a brownish central spot; head brown, its subocular part and chest with blue spots, head crossed by an oblique white band from nape to preopercular, about spine as wide as eye. Spinous dorsal yellow, soft dorsal, anal and caudal red brown with bluish spots fading into brown; trunk and tail crossed by six or seven brown transverse bands, as wide as or somewhat narrower than interspaces. Length up to 500 mm.

Habitat: Singapore!; Java (Batavia!); Celebes (Makassar); Ambon; New Guinea (Port Moresby). — Philippines, Pelew Ild., Solomons, Queensland, Darnley Isl. North Western Australia.

2. **Euxiphipops xanthometopon** (Blkr.).

Holacanthus xanthometopon Bleeker, Nat. Tijdschr. Ned. Indië IV, 1853, p. 258. — Nat. Tijdschr. Ned. Indië XV, 1858, p. 200.
Holacanthus xanthometopon Günther, Cat. Brit. Mus. II, 1860, p. 51.
Holacanthus xanthometopon Day, Fish. India 4° 1878—1888, p. 114.
Holacanthus xanthometopon Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877; Rév. Chétodont. p. 135. — Atl. ichth. IX, 1877, p. 64.
Holacanthus xanthometopon Macleay, Proc. Linn. Soc. N. S. Wales VII, 1882, p. 244.
Holacanthus xanthometopon Day, Fish. Brit. India II, 1889, p. 18.
Holacanthus xanthometopon Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 95.
Holacanthus xanthometopon Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 260.
Holacanthus xanthometopon Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 163.
Heteropyge xanthometopon Fraser-Brunner, Proc. Zool. Soc. London 1933, p. 570.
Holacanthus xanthometopon Herre, Notes Fish. Stanford Univ. 1931, p. 62.

D. XIV, 16—18; A. III, 16—18; L.r. about 46—50.

Oblong-oval, with nearly evenly convex dorsal and ventral contour, rostro-dorsal profile about evenly declivous from lips to dorsal, height 1.7—1.9 in length; head 2.4—3.5. Eye 3.8—4.4 in head and 1.5 to twice in broadly convex interorbital space, situated not much above horizontal through tip of snout which is blunt with strongly oblique gape and prominent chin. Preorbital feebly dentate, the hindmargin not free; preoperculum finely serrate behind, several strong spines below; interoperculum large, entire. Scales on trunk rhombic with strongly radiating striae, no auxiliaries, on head minute, unequal, on cheeks rugose and more conspicuous as also on operculum. Spinous dorsal much longer than soft; spines graduate the last about as long as head without snout; soft dorsal and anal evenly rounded, third anal spine as long as last dorsal. Pectorals acutely rounded, shorter than head, ventrals with the first ray produced, extending beyond anal spines, ventral spine shorter than head. Caudal rounded, least height of its peduncle nearly equalling half head. In alcohol body generally brownish, scales with a dark centre, head blackish or brownish, with pale markings besides an interorbital pale patch including eye and nostrils; pectorals, dorsal and caudal yellow, a black ocellus at base of last dorsal rays; ventrals and anal dark brown. Length up to 385 mm.

Habitat: Sumatra (Telok betong); Celebes (Limbe Strait); Goram Archipelago; Waigeu; New Guinea. — Andamans, Pelew Isl., Ponape.

3. **Euxiphipops navarchus** (C.V.).

Holacanthus navarchus Cuvier & Valenciennes, Hist. Nat. Poiss. VII, 1831, p. 171.
Holacanthus navarchus Bleeker, Nat. Tijdschr. Ned. Indië VI, 1854, p. 99.
Holacanthus navarchus Günther, Cat. Brit. Mus. II, 1860, p. 49.
Holacanthus navarchus Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 287.
Holacanthus navarchus Günther, Brenchley's Cruise of the „Curaçao" 1873, p. 410.
Holacanthus navarchus Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877, p. 136. — Atl. ichth. IX, 1877, p. 65.
Holacanthus navarchus Macleay, Proc. Linn. Soc. N. S. Wales, VIII, 1883, p. 263.
Holacanthus navarchus Jordan & Seale, Bull. Bur. Fishes XXV, (1905) 1906, p. 348.
Holacanthus navarchus Ogilby, Mem. Queensland Mus. III, 1915, p. 100.
Holacanthus navarchus Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 260.
Holacanthus navarchus Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 167.
Holacanthus navarchus Herre, Notes Fish. Stanford Univ. 1931, p. 61.
Heteropyge navarchus Fraser-Brunner, Proc. Zool. Soc. London, 1933, p. 571.

D. XIV, 17—18; A. III, 17—18; L.r. 48—50.

Oblong-oval; rostro-frontal profile obliquely convex, height 1.7—1.8 in length, head 3.1—3.4, somewhat shorter than broadly convex interorbital space in adult and shorter than prominent snout; situated nearly in middle of head, high above horizontal through rather wide and oblique gape of mouth; lower jaw prominent, teeth rather long, vomerine teeth present. Preorbital not free behind, the convex lower border with small spines; preoperculum serrate behind, the lower edge with strong spines, angular spine much longer than eye; interoperculum large, entire. Scales on trunk strongly ctenoid, striated, rather large, without auxiliaries, arranged in pronounced regular transverse series, forming a sheath for spinous dorsal; minute on head, larger, spinulose, irregular on cheeks and in about eight vertical rows on operculum. Lateral line complete or nearly so. Spinous dorsal nearly twice longer than soft; spines graduate, the last about as long as head without snout; soft dorsal and anal rounded, third anal spine about equal last dorsal. Pectorals about equal head. Ventrals with the first ray strongly produced, reaching at least third anal spine, about 1.4 in length of head. Caudal rounded, least height of its peduncle 1.4 in head. Yellowish, a bluish curved stripe from upperlip along base of pectoral to behind ventral, a similar curved stripe from about sixth dorsal spine to vent, the space between them blackish brown; a posterior patch, anteriorly confined by a bluish band comprising anal, part of soft dorsal and caudal peduncle is marked by silvery dots; the trunk scales between both patches with a dark centre, subocular part of head, chest, dorsal and caudal yellow, the two last edged with white and a submarginal black line; pectorals and ventrals brown. Length 195 mm.

Habitat: Java (Batavia); Flores!; Ambon!; Banda; Ceram; Misol.

4. **Genicanthus** Swainson.

(Swainson, Nat. Hist. Anim. Fish. II, 1839, p. 212).
Genotype: *Holacanthus lamarck* Lac.

Oblong-oval, covered with rounded scales, on trunk regular and of moderate size, in the anterior dorsal part with single basal auxiliaries; on head and median fins small to minute, somewhat larger on cheek and operculum; lateral line arched, complete but more or less interrupted on caudal peduncle. Head rounded with blunt, short snout, mouth small with equal styliform teeth. Diameter of eye shorter than convex interorbital space. Preorbital strongly serrated, hindmargin free, lower notched. Interoperculum large with or without spines; preoperculum strongly dentate. Anterior nostril rounded, smaller than oval posterior. D. XV, 15—17; A. III, 16—18. Spinous dorsal twice or more than twice longer than soft. Soft dorsal and anal obtusely or acutely pointed; caudal deeply concave, the marginal rays much produced.

Distribution: Rather rare marine fishes, locally distributed from Red Sea, Madagascar, Mauritius, through the indo-australian Archipelago and Philippines to Riukiu Isl. and to Lord Howe Isl.

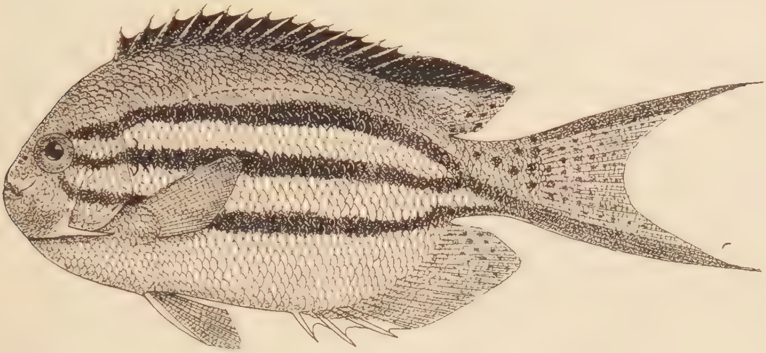

Fig. 39. *Genicanthus lamarck* (Lac.) × 4/7.

Key to the species of Genicanthus.

1. Preorbital with strong spines, lower margin deeply notched. Lower border of preoperculum denticulate. Soft dorsal and anal obtusely pointed. 3—5 longitudinal bands from eye to caudal . . . . 1. *G lamarck* p. 151.
2. Preorbital with enlarged fordwardly directed spine on anterior margin, lower margin superficially notched. Lower border of preoperculum strongly dentate. Soft dorsal and anal acutely pointed. Transverse bands on sides of different extension, sometimes even absent . . . . . . 2. *G. melanospilus* p. 153.

1. **Genicanthus lamarck** (Lac.). (Fig. 39).

Holacanthus lamarck Lacépède, Hist. nat. Poiss. IV, 1802, pp. 526, 530.
Holacanthus lamarck Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 198.
Genicanthus larmarckii Swainson, Nat. Hist. Anim. II, 1839, p. 212.
Holacanthus lamarckii Bleeker, Nat. Tijdschr. Ned. Indië VI, 1854, p. 100.
Holacanthus lamarckii Günther, Brenchley's Cruise of the „Curaçao" 1873, p. 420.
Holacanthus lamarckii Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877, Rév. Chétodont. p. 122. — Arch. Néerl. Sc. Nat. XII, (1876) 1877, p. 22. — Atl. ichth. IX, 1877, p. 59.
Holacanthus lamarcki Herre & Montalban, Philippine Journal Sci. XXXIV, 1927, p. 83.
Holacanthus lamarck Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 161

Holacanthus lamarcki subspec. *japonicus* Schmidt, Trans. Pacific Comm. Acad. Sci. U. S. S. R. 1930, p. 99.
Holacanthus chapmani Herre, Copeia 1933 No. 1. p. 19.
Genicanthus lamarck Fraser-Brunner, Proc. Zool Soc. London 1933, p. 575.

D. XV, 15—16; A. III, 17—18; L.r. 48—50.

Oblong-ovate, anteriorly robust, compressed posteriorly, rostrodorsal profile convex, height more or less than twice in length, head somewhat more or less than 4, obtuse. Eye 3.5 —4 in anterior half of head, far above horizontal through small gape of mouth, much shorter than strongly convex interorbital space; snout obtuse, not prominent, slightly longer than eye. Preorbital with two strong forward-pointed spines, the lower free hindmargin strongly serrated and separated by a deep notch; hind- and lower margin of preoperculum denticulate, its spines nearly half length of head; suboperculum and interoperculum scarcely denticulate, operculum with about eight series of scales. Posterior nostril oval, somewhat larger than rounded anterior. Scales on trunk moderate, rounded, in regular longitudinal and transverse series, irregular along back, where in its anterior part auxiliaries are developed; scales on median fins, head and breast small to minute; lateral line parallel to contour of back, terminating at end of dorsal but continued on middle of tail to caudal. Spinous dorsal more than 2½ times longer than soft, spines graduate, the last much shorter than half of head: third anal spine longer, soft dorsal and anal pointed. Pectorals slightly longer than head; ventrals with their prolonged first ray much longer, reaching anal or nearly so; ventral spine about $^2/_3$ length of head. Caudal deeply concave, the outer rays produced into long filaments, total fin about 2.5 times in total length, least height of caudal peduncle about thrice diameter of eye. Brownish above passing over into creamy below, spinous dorsal and upper margin of soft dorsal, soft anal and caudal with black spots; three to five, slightly undulating dark bands from eye to caudal; a yellow spot on nape. Four varieties are described: 1) Ventrals black, outer caudal filaments pale: *a.* 4 or 5 longitudinal bands (*lamarck* type) *b.* 3 longitudinal bands, the upper narrow, lower two as wide as eye (*trilineatus* Brunner); 2) Ventrals yellow, outer caudal filaments black: *a.* 4 or 5 longitudinal bands, upper as wide as eye, bending posteriorly on to lower edge of caudal peduncle, lower ones narrow; upper stripe sometimes narrow, superimposed on a broad paler one (*japonicus* Schmidt); *b.* 3 longitudinal bands, uppermost slightly wider than eye bending posteriorly on to lower edge of caudal peduncle, the lower two half as wide as eye (*amboi-*

nensis Brunner) [1]). Besides there may be other minor modifications in pattern. Length 240 mm.

Habitat: Ambon!; Nusa-laut; Buru; Ceram; Banda; Misol; Philippines, Riu-Kiu Isl.

2. **Genicanthus melanospilus** (Bleeker).

Holacanthus melanospilus Bleeker, Acta Soc. Sc. Indo-Neerl. II, 1857, p. 56.
Holacanthus caudovittatus Günther, Cat. Brit. Mus. II, 1860, p. 44.
Holacanthus melanospilus Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877, Rév. Chétodont. p. 124.
Holacanthus caudavittatus Bleeker, Arch. Néerl. Sc. Nat. XII, (1876) 1877, p. 22.
Holacanthus melanospilus Bleeker, ibidem.
Holacanthus melanospilus Bleeker, Atl. ichth. IX, 1877, p. 60.
Holacanthus melanospilus Klunzinger, Fische Roth. Meer. 1884, p. 60.
Holacanthus caudibicolor Sauvage, Poiss. Madagascar 1891, p. 267.
Holacanthus semicinctus Waite, Rec. Austral. Mus. III, 1900, p. 204.
Holacanthus semicinctus Waite, Rec. Austral. Mus. V, 1903, p. 37.
Holacanthus caudovittatus Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 162.
Holacanthus melanospilus Fowler & Bean, ibidem.
Genicanthus melanospilus Fraser-Brunner, Proc. Zool. Soc. London, 1933, p. 574.

D. XV, 16—17; A. III, 17—18; L.r. 48—50.

Oblong-oval; rostro-dorsal profile convex, height more than twice in length, head 4 to 4.5, obtuse. Eye 3—4 in head, its diameter somewhat shorter than interorbital space and equal to snout. Preorbital with small spines and enlarged forwardly directed spine on anterior margin and an undeep notch; interoperculum entire, suboperculum denticulate; preoperculum with denticulate hindmargin and stronger spines on lower margin, angular spine much longer than eye. Anterior nostril round, smaller than oval posterior. Scales on trunk moderate, rounded, in regular series, auxiliaries present on nek, below spinous dorsal, on throat and breast, nearly wanting on sides; on head and median fins small, on operculum about in 3 transverse series; lateral line complete. Spinous dorsal more than twice longer than soft dorsal, spines graduate, the last shorter than head without snout. Soft dorsal and anal pointed, some of the postmedian rays being prolonged; third anal spine about as long as last dorsal. Pectorals nearly equal head, ventrals with the first ray somewhat produced, reaching anal, ventral spine shorter than head without snout. Caudal concave, the marginal rays produced into filaments much to twice longer than head; least height of caudal peduncle twice diameter of eye. Yellowish above passing over in pearl-coloured ground colour with about 15 somewhat irregular brownish transverse bands which are reduced on nape and above eye; median fins dilutely dotted with yellow on a reddish ground colour, dorsal and anal with a violet border, paired fins yellow, a black patch before ventrals. The transverse bands may be restricted to the upper half of the trunk *(semicinctus* Waite) or entirely absent and the outer margin of the caudal black (*caudovittatus* Günther). Length 211 mm.

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[1]) This variety seems to be identical with *Holacanthus chapmani* Herre from the Philippines. In this case the variety *amboinensii* described and pictured by Fraser-Brunner on p. 576 ought to get the name *chapmani* Herre.

Habitat: Ambon; — Red Sea, Madagascar, Mauritius, Lord Howe Island.

5. **Holacanthus** Lacépède.

(Lacépède, Hist. nat. Poiss. IV, 1803, p. 525).
Angelichthys Jordan & Evermann, Rep. U. S. Fish. Comm. XXI, 1896, p. 420.
Genotype: *Chaetodon tricolor* Bloch.

Rhomboidal to oval, sides covered with large ctenoid scales in regular series, 50 or less in linea recta, on head also large or moderate with not spinulose surfaces or small but distinct with spinulose surfaces; on operculum in about 9 vertical rows or small to very small, more or less irregular; lateral line terminating near end of dorsal, sometimes with a separate portion on caudal peduncle. Hindmargin of preorbital not free, entire, its lower margin without notch; interoperculum long or moderate, with or without spines anteriorly. Interorbital width greater than eye. Teeth in lower jaw long. D. XIV, 17—20, A. III, 18—20, both fins somewhat arcuate, not produced or much produced in adult. Young resembling adults or with ocular band and transverse stripes.

Distribution: Marine fishes of moderate size inhabiting costal waters of all tropical seas.

1. Subgenus **Apolemichthys** Fraser-Brunner.

Scales on head moderate or large, on operculum in about 9 vertical rows, on cheeks small, irregular, their surfaces not spinulose; on trunk in 48—50 regular series, with or without auxiliaries. Preorbital convex, finely serrated or dentated, without powerful spines; interoperculum without strong spines; preopercular spine not deeply grooved. D. XIII—XIV, 17—19; A. III, 18, both fins not produced. Young resembling adults. Body yellowish.

Distribution: The three known species inhabit the Indo-Pacific and are restricted respectively to India and Ceylon, to

Hawaii or to the indo-australian Archipelago, the coast of East-Africa and the region of Madagascar.

1. **Holacanthus (Apolemichthys) trimaculatus** C.V. (Fig. 40).

Holacanthus trimaculatus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831. p. 196.
Holacanthus trimaculatus Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 242.
Holacanthus trimaculatus Günther, Cat. Brit. Mus. II, 1860, p. 50.
Holacanthus trimaculatus Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 287.
Holacanthus trimaculatus Playfair, Fish. Zanzibar 1866, p. 38.
Holacanthus trimaculatus Peters, Monatsber. Akad. Berlin 1876, p. 438.
Holacanthus trimaculatus Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877, Rév. Chétodont, p. 133. — Atl. ichth. IX, 1877, p. 63. —Arch. Néerl. Sc. Nat. XIII, 1878, p. 45. — Verh. Akad. Amsterdam XVIII, (1877), p. 14.
Holacanthus trimaculatus Sauvage, Poiss. Madagascar, 1891, p. 516.
Holacanthus trimaculatus Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 94.
Holacanthus trimaculatus Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 261.
Holacanthus trimaculatus Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 166.
Holacanthus trimaculatus Herre, Notes Fish. Stanford Univ. 1931, p. 61.
Holacanthus (Apolemichthys) trimaculatus Fraser-Brunner, Proc. Zool. Soc. London 1933, p. 579.

D. (XIII) XIV, 17—18; A. III, 18; L.r. 45—48.

Ovate, dorsal and ventral profile nearly evenly convex, rostrodorsal profile above blunt prominent snout ascending in a straight line to convex nape; height 1.6—1.8 in length, head 3.3—3.7, shorter than its height. Eye 3.2—3.8, about equal to snout and 1.2—1.5 in moderately arched, somewhat tumid interorbital space, situated midway in head, not far above horizontal through small, somewhat oblique gape of mouth. Preorbital with a strong, coarsely dentate convexity reaching over upper jaw, not free behind; preoperculum weakly dentate behind, entire below, angular spine curved, not grooved, 2.6—2.7 in head; interoperculum large, entire. Nostrils small, close together, rounded, equal, anterior with a valve. Scales rather large, rounded, ctenoid with radiating striae; on trunk, especially in its dorsal and anterior part, with an auxiliary at base of majority of scales, on head smaller, irregular and unequal; lateral line arched, concurrent with dorsal profile, terminating at end of dorsal. Spinous dorsal at least twice shorter than soft; the spines graduate, the last 1.4—1.9 in head; soft dorsal and anal obtusely pointed. Pectorals about equal head; acute ventrals likewise, reaching vent. Caudal slightly rounded, least height of its peduncle twice in head. Uniform yellowish, in alcohol the dorsal, ventral and caudal scales or all scales on trunk with a more or less pronounced central pearly spot; an oval brown spot at commencement of lateral line, a much smaller one on each side of nape [1]), lips and outer half of anal black, other fins yellow. Length up to 260 mm.

Habitat: Pulu Weh (Sabang)!; Java; Celebes; Banda; Ambon!; New Guinea (Doreh). — Zanzibar, Mauritius, Bourbon, Seychelles, Philippines.

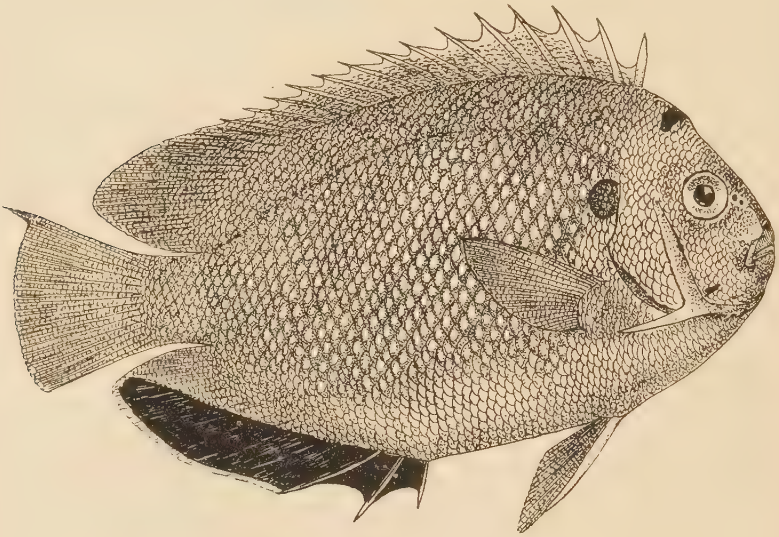

Fig. 40. *Holacanthus (Apolemichthys)* trimaculatus C.V. × 2/3.

6. **Pygoplites** Fraser-Brunner.

(Fraser-Brunner, Proc. Zool. Soc. London 1933, p. 587).
Genotype: *Holacanthus diacanthus* Boddaert.

Oblong ovate, sides covered with moderate, finely ctenoid, regularly arranged scales, the anterior, especially on chest, with few basal auxiliaries, on median fins and head minute to smaller, largest and regular on preoperculum and cheeks, on operculum in about eight vertical rows; lateral line terminating at end of dorsal. Preorbital anteriorly angularly convex and slightly denticulate, hind border not free. Interorbital entire. D. XIV, 17—19; A. III, 17—19. Spinous dorsal twice longer than soft; soft dorsal and anal not produced; caudal rounded. For other characters see those of the single species known.

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[1]) By exception they are confluent; in this case only the name trimaculatus is not a misnomer.

Distribution: That of the single species known.

1. **Pygoplites diacanthus** (Bodd.). (Fig. 41).

Chaetodon diacanthus Boddaert, Epistola de Chaetodonti diacantho Amstelodami, 1772.
Chaetodon diacanthus Boddaert, Schriften Ges. naturf. Freunde Berlin III, 1782, p. 459.
Chaetodon boddaerti Gmelin, Syst. nat. Linn. I, 1789, p. 1243.
Chaetodon dux Gmelin, l. c. p. 1255.
Chaetodon fasciatus Bloch, Naturg. Ausländ. Fische III, 1787, p. 53 (nec Forskål).
Chaetodon diacanthus Bloch, Schneider, Syst. Ichth. 1801, p. 220.
Holacanthus dux Lacépède, Hist. Nat. Poiss. IV, 1802 pp. 527, 534.
Acanthopodus boddaerti Lacépède, loc. cit. pp. 558, 559.
Holacanthus dux Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 184.
Holacanthus dux Rüppell, Neue Wirbelth. Fische, 1835, p. 37.
Holacanthus dux Bleeker, Nat. Tijdschr. Ned. Indië III, 1852, p. 757.
Holacanthus dux Rüppell, Samml. Senckenberg. Mus. 1852, p. 10.
Holacanthus dux Bleeker, Acta Soc. Sc. Indo-Neerl. VIII, 1860, p. 35.
Holacanthus diacanthus Günther, Cat. Brit. Mus. II, 1860, p. 48.
Holacanthus diacanthus Kner, Fische Novara-Exp. 1863—65, p. 274.
Holacanthus diacanthus Playfair, Fish. Zanzibar 1866, p. 37.
Holacanthus diacanthus Klunzinger, Verh. Zool. Bot. Ges. Wien XX, 1870, p. 786.
Holacanthus diacanthus Bleeker, Ned. Tijdschr. Dierk. IV, (1871) 1872, p. 140.
Holacanthus diacanthus Günther, Brenchley's Cruise „Curaçao" 1873, p. 410.
Holacanthus diacanthus Günther, Fische Südsee 1873—75, p. 50.
Holacanthus diacanthus Bleeker, Enumérat. Poiss. Madagascar 1875, p. 96. — Verh. Akad. Amsterdam XVII (1876) 1877. Rév. Chétodont. p. 138. — Atl. ichth. IX, 1877, p. 65. — Arch. Néerl. Sc. Nat. XIII, 1878, p. 45.
Holacanthus diacanthus Day, Fish. India 4°, 1878—1888, p. 113.
Holacanthus diacanthus Macleay, Proc. Linn. Soc. N. S. Wales VIII, 1883, p. 263.
Holacanthus diacanthus Klunzinger, Fische Roth. Meer 1884, p. 60.
Holacanthus diacanthus Sauvage, Poiss. Madagascar 1891, p. 266.
Holacanthus bispinous Jordan & Evermann, Bull. U. S. Fish Comm. XXIII, 1905, p. 378 (nec Günther).
Holacanthus diacanthus Seale, Occas. Papers Bishop Mus. IV, 1906, p. 66.
Holacanthus diacanthus Jordan & Seale, Bull. Bureau Fish. XXV, (1905) 1906, p. 347. — Bull. Bureau Fish. XXVI (1906) 1907, p. 34.
Holacanthus diacanthus M. Weber, Fische Siboga-Exp. 1913, p. 312.
Holacanthus diacanthus Ogilby, Mem. Queensland Mus. III, 1915, p. 100.
Centropyge diacantha Jordan & Jordan, Mem. Carnegie Mus. X, 1922, p. 64.
Holacanthus diacanthus Herre & Montalban, Philippine Journal Sci. XXXIV, 1927, p. 88.
Holacanthus diacanthus Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 250.
Holacanthus diacanthus Duncker & Mohr, Mitt. Zool. Mus. Hamburg XLIV, 1929, p. 73.

Holacanthus diacanthus Fowler & Bean, U. S. Nat. Mus. VIII, 1929, p. 169.
Holacanthus diacanthus Herre, Notes Fish. Stanford Univ. 1931, p. 61.
Pygoplites diacanthus Fraser-Brunner, Proc. Zool. Soc. London 1933, p. 587.

D. XIV, 17—19; A. III, 17—19. L.r. 45—50.

Oblong ovate, rostro-dorsal profile obliquely ascending, somewhat concave before eye, on nape convex, height 2—2.3 in length; head 3.3 to more than 4. Eye 3.25—4, in middle of head, nearly its own diameter above horizontal through gape of mouth; almost flat interorbital space broader than diameter of eye; snout still longer, rather pointed. Preorbital angularly convex, nearly entire, hindborder not free; preoperculum more or less coarsely denticulate, lower border with several small teeth, angular spine flat, twice or less in head. Interoperculum small, entire. Posterior nostril oval, longer than rounded anterior. Scales rounded, finely ctenoid, on trunk moderate, regularly arranged; in anterior part, especially on breast, partially with basal auxiliaries, on head minute, larger on cheek, preoperculum and operculum where they are arranged in about eight vertical series; lateral line terminating at end of dorsal. Spinous dorsal twice longer than soft; spines graduate, last spine more than half length of head; soft dorsal regularly rounded or obtusely angulate, the median rays longest, much longer than spines; soft anal of similar form, last anal spine $^{1}/_{3}$ shorter than last dorsal. Pectorals and ventrals shorter than head. Caudal rounded, least height of its peduncle about 2½ times in head. Yellowish, crossed by 8 or 9 pale bluish transverse bands, easily fading into greyish or yellowish, broadly edged with black,

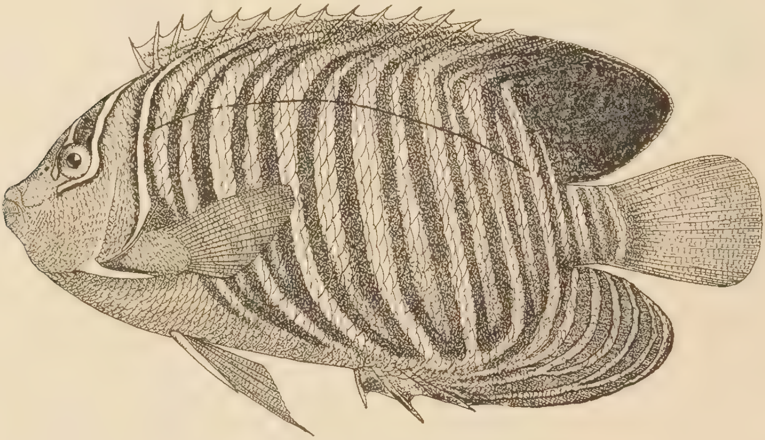

Fig. 41. *Pygoplites diacanthus* (Bodd.) × $^{5}/_{9}$.

as wide as interspaces; the seven anterior bands abruptly bent and continued on dorsal, the eighth crossing caudal peduncle and continued on anal; the ninth crossing base of caudal; a narrow bluish black-edged band before and behind eye, soft dorsal blackish, soft anal with several longitudinal bluish streaks; caudal and paired fins yellow. After Fowler and Bean small examples show less transverse bands, the last formig a blackish ocellus on soft dorsal; in very young trunk and tail with but 4 transverse pale bands, large black ocellus on soft dorsal larger thans eye. Length 235 mm.

Habitat: Java; Flores; Timor; Celebes (Makassar, Labuan Data Bay, Binang Unang Isl.); Talisse Isl.; Buru; Ambon!; Banda!; Ceram!; Misool; New Guinea (Astrolabe Bay!). — Red Sea, Mombassa, Zanzibar, Madagascar, Mauritius, British India, Philippines, Australia, Melanesia, Micronesia, Polynesia.

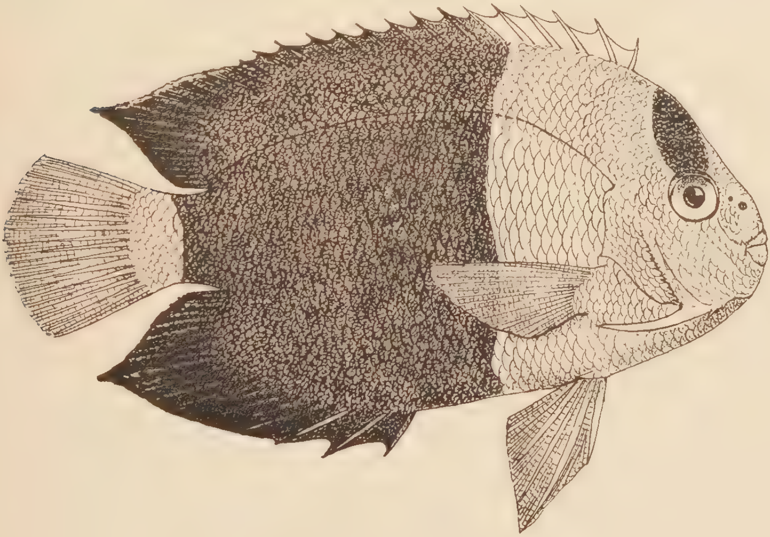

Fig. 42. *Centropyge bicolor* (Bloch). × $^{10}/_{11}$.

7. **Centropyge** Kaup.

(Kaup, Arch. für Naturgeschichte XXVI, 1860, p. 64).
Xiphipops D. St. Jordan & E. K. Jordan, Mem. Carnegie Mus. X, 1922, p. 64.
Genotype: *Holacanthus tibicen* C.V.

Ovate, head and body covered with large, coarsely and horizontally striate scales without auxiliaries, on trunk arranged in regular longitudinal series, about 48 in linea recta, on head only slightly smaller, on operculum usually in 4 to 5 series; lateral line terminating near end of dorsal. Preorbital with hindmargin serrated or with strong spines. Preoperculum usually with strongly dentate hindmargin, its inferior margin with strong teeth, sometimes spiniform. Interoperculum small, convex, not reaching suboperculum, serrate or with spines posteriorly. Interorbital space convex, equal to or less than eye. D. XIII—XV, 16—18; A. III, 16—18. Spinous dorsal much longer than soft. Soft dorsal and anal usually obtusely pointed, by exception evenly rounded. Pectorals equal to or shorter than head, ventrals not reaching beyond origin of anal. Caudal triangularly or obtusely rounded. Young resembling adults.

Distribution: Marine fishes of small size, inhabiting costal waters and reefs of tropical and subtropical part of Indo-Pacific from East coast of Africa to Polynesia, northwards reaching to China and Japan, southwards to Australia.

Key to the indo-australian species of Centropyge.

I. D. XIII, 16—17. Dorsal and anal evenly rounded. Scales on operculum in 7—9 vertical rows. Caudal triangularly rounded with dark transverse bands. Body with 7—10 transverse bands. 1. *multifasciatus* p. 161.

II. D. XIV—XV, 15—18. Dorsal and anal obtusely pointed, by exception obtusely rounded. Scales on operculum in 5 or less vertical rows. Caudal rounded, uniform yellow or dark. Body particoloured or uniform dark or paler, by exception with nearly 20 transverse bands.

    A. Anterior part of body yellow, abruptly divided from blackish or bluish posterior half. A supraocular blackish blotch. Caudal uniform yellow . . . . 2. *biocolor* p. 161.

    B. Body not parti-coloured as above: head without marking. Caudal uniform dark.

        1. Body blackish, a pale oval patch on side. Preorbital rhombic, dentate, its lower edge entire . . . . 3. *tibicen* p. 163.
        2. Uniform dark brown. Lower edge of preorbital coarsely denticulate . . . . . . 4. *nox* p. 164.
        3. Yellowish with 17—30 darker transverse bands. Behind preopercular spine an equal or smaller one . . . . 5. *bispinosus* p. 165.
        4. Uniform brown, somewhat darker posteriorly; each scale with a pearly centre. Preopercular armature similar to bispinosus. Dorsal and anal obtusely rounded. 6. *vroliki* p. 167.

1. **Centropyge multifasciatus** Smith & Radcl.

Holacanthus multifasciatus Smith & Radcliffe, Proc. U. S. Nat. Mus. XL, 1911, p. 342.
Holacanthus multifasciatus Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 179.
Centropyge multifasciatus Fraser-Brunner, Proc. Zool. Soc. London 1933, p. 594.

D. XIII, 17—18; A. III, 17—18; L.r. 46.

Subrhomboidal; rostro-dorsal profile nearly straight, height 1.6—1.7 in length; head 2.7—3.2; snout short, blunt 2.5—3.5 in head; mouth small, terminal. Eye 2.4—2.6, slightly longer than snout or flattened interorbital space; preorbital armed with several strong, sharp denticles, hindmargin free; preoperculum with well developed denticulation on hindborder, angular spine strong, curved, longer than snout, two weaker spines on horizontal limb. Seven to nine vertical rows of scales on operculum. Nostrils of moderate size, the anterior with a fold ending in a flap posteriorly, the posterior elliptical. Teeth fine, brush-like, trilobed, lateral lobe small; rows of teeth distinct, with well-marked interspaces. Scales regular in arrangement, those in middle of sides slightly larger than others; scales subrhomboidal, strongly ctenoid. Lateral line arched, terminating beneath end of dorsal. Spinous dorsal twice shorter than soft; spines slender, curved, fifth slightly longer than others, 1.1—1.2 in head; third anal spine 1.3—1.4 in head, soft dorsal and anal evenly rounded. Pectorals slightly longer than head; ventrals with the rays prolonged, reaching base of second anal spine. Caudal short, rounded, 2.2 in head. Colour in alcohol dusky cream, crossed by ten seal-brown vertical bands about as wide as interspaces, in young but seven; first ocular, slightly narrower than eye, from nape curving down towards base of ventral, fading out on breast; caudal with about 6 transverse narrow bands, all more or less broken, variable and several of outer series with appearance of spots. Length up to 83 mm. (Not seen by us).

Habitat: Borneo (Mabul Isl.); Celebes (Gulf of Tomini, Dodepo and Pasejogo Islds., Binang Unang Isl.); Talisse Isl.; Buru; Halmaheira. —

2. **Centropyge bicolor** (Bloch). (Fig. 42).

Chaetodon bicolor Bloch, Ausl. Fische III, 1787, p. 94.
Chaetodon bicolor Gmelin, Linn. Syst. Nat. I, 1789, p. 1258.
Chaetodon bicolor Bloch, Schneider, Syst. Ichth. 1801, p. 218.
?*Chaetodon chrysurus* Bloch, Schneider, loc. cit., p. 228.

Holacanthus bicolor Lacépède, Hist. Nat. Poiss. IV, 1803, pp. 527, 535.
Holacanthus bicolor Cuvier & Valenciennes, Hist. Nat. Poiss. VII, 1831, p. 167.
Holacanthus bicolor Rüppell, Samml. Senckenberg. Mus. 1852, p. 10.
Holacanthus bicolor Bleeker, Nat. Tijdschr. Ned. Indië V, 1853, p. 77.
Holacanthus tenigab Montrouzier, Ann. sc. phys. Soc. d'Agricult. Lyon (2) VIII, 1856, p. 447.
Holacanthus bicolor Bleeker, Acta Soc. Sc. Indo-Neerl. VIII, 1860, p. 26.
Holacanthus bicolor Günther, Cat. Brit. Mus. II, 1860, p. 50. — Brenchley's Cruise of the „Curaçao" 1873. — Fische Südsee 1873—75, p. 51.
Holacanthus bicolor Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877, p. 127. — Atl. ichth. IX, 1877, p. 61. — Arch. Néerl. Sc. Nat. XIII, 1878, p. 45.
Holacanthus bicolor Macleay, Proc. Linn. Soc. N. S. Wales., VII, 1882, p. 244.
Holacanthus bicolor De Vis, loc. cit. IX, 1884, p. 457.
Holacanthus bicolor M. Weber, in Semon Zool. Forsch. Reisen V, 1895, p. 246.
Holacanthus bicolor Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII, (1903) 1905, p. 380.
Holacanthus bicolor Jordan & Seale, Bull. Bur. Fish. XXVI (1905) 1906, p. 348.
Holacanthus bicolor Steindachner, Sitz. Akad. Wien CXI, 1906, p. 1391.
Holacanthus bicolor Jordan & Seale, Bull. Bur. Fish. XXVI, (1906) 1907, p. 34.
Holacanthus bicolor M. Weber. Fische Siboga-Exp. 1913, p. 312.
Holacanthus bicolor Ogilby, Mem. Queensland Mus. III, 1915, p. 103.
Chaetodontoplus bicolor Jordan & Jordan, Mem. Carnegie Mus. X, 1922—25, p. 61.
Holacanthus bicolor Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 91.
Holacanthus bicolor Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 261.
Holacanthus bicolor Duncker & Mohr, Mitt. Zool. Mus. Hamburg XLIV, 1929, p. 73.
Holacanthus bicolor Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 172.
Holacanthus bicolor var. *oahuensis* Borodin, Bull. Vanderbilt Mar. Mus. I, 1930, p. 56.
Holacanthus bicolor Herre, Notes Fish. Stanford Univ. 1931, p. 61.
Centropyge bicolor Fraser-Brunner, Proc. Zool. Soc. London 1933, p. 589.

D. XV, 16—17; A. III, 17—18; L.r. 45—48.

Elongate, ovate, anteriorly somewhat elevated, rostro-dorsal profile strongly ascending in a nearly straight line to nape, ventral profile convex between chin and ventrals; height 1.8—2.2 in length, head 3.3 to nearly 4. Eye 3—3.6, equal to or slightly less or more than nearly flat interorbital space, equal to bluntly pointed small snout, situated in middle of head, about half eye diameter above horizontal through small horizontal gape of mouth; jaws equal, teeth very slender, long. Preorbital free, lower border convex, anteriorly serrated, posteriorly with about 6—7 strong spines;

preoperculum serrated behind, angular spine longer than eye, before it 2 rather strong spines and a few smaller ones; interoperculum short, rounded, more or less spinous; posttemporal conspicuous, rounded, serrate. Nostrils small, equal, posterior oval. Scales ctenoid, rather large, striated, anteriorly and dorsally on trunk some scattered auxiliaries present; lateral line anteriorly arched, further concurrent with dorsal contour, terminating at end of dorsal. Spinous dorsal more than twice longer than soft; spines graduate, the last somewhat longer than half head; third anal spine about equally long but more robust; soft dorsal and anal with the central rays elongate into an acute point, reaching last third of caudal. Pectorals equal head; first ray of ventrals produced, nearly reaching anal. Caudal rounded, least height of its peduncle about half length of head. Anterior half of body, pectorals, ventrals, caudal and part of dorsal yellow; posterior part of trunk, rest of dorsal and anal black, likewise a supra-ocular patch on nape, confluent with its fellow, diffuse below eye. Length up to 115 mm.

Habitat: Sumatra (Priaman); Flores; Solor; Kisser!; Celebes (Limbe Strait); Talisse Isl.; Makian Isl.; Ternate; Ceram; Ambon!; Saparua; Banda!; Aru Isl.; New Guinea (Doreh, Moreton Bay). — Philippines, Australia (Queensland), Melanesia, Micronesia, Polynesia.

3. **Centropyge tibicen** (C.V.).

Holacanthus tibicen Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 173.
Holacanthus leucopleura Bleeker, Nat. Tijdschr. Ned. Indië V, 1853, p. 79. — Acta Soc. Sc. Indo-Neerl. VIII, 1860, p. 35.
Holacanthus tibicen Günther, Cat. Brit. Mus. II, 1860, p. 46.
Holacanthus leucopleura Günther, ibidem. — Brenchley's Cruise of the „Curaçao" 1873, p. 410.
Holacanthus tibicen Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877, Rév. Chétodont. p. 129. — Atl. Ichth. IX, 1877, p. 62. — Arch. Néerl. Sc. Nat. XIII, 1878, p. 45.
Holacanthus tibicen Waite, Rec. Austral. Mus. III, 1900, p. 203.
Holacanthus tibicen Jordan & Fowler, Proc. U. S. Nat. Mus. XXV, 1902, p. 547.
Holacanthus tibicen Jordan & Starks, Proc. U. S. Nat. Mus. XXXII, 1907, p. 501.
Holacanthus tibicen M. Weber, Fische Siboga-Exped. 1913, p. 312.
Holacanthus tibicen Ogilby, Mem. Queensland Mus. III, 1915, p. 100.
Holacanthus tibicen Herre & Montalban, Philippine Journ. Sc. XXXIV, p. 1927, p. 90.
Holacanthus tibicen Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 261.
Holacanthus tibicen Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1829, p. 174.
Holacanthus tibicen Herre, Notes Fish. Stanford Univ. 1931, p. 61. — Journ. Pan-Pacific Res. Instit. VI, 1931, p. 13.

Centropyge tibicen Fraser-Brunner, Proc. Zool. Soc. London, 1933, p. 591.

D. XIV, 16—17; A. III, 16—17, L.r. 45—48.

Elongate ovate, anteriorly somewhat elevated, rostro-dorsal profile nearly steeply ascending, with a slight convexity before eyes; profile from chin to ventrals evenly convex, height 1.8—2 in length, head 3.6 to 4, equal to convex somewhat bulging interorbital space, longer than short, blunt snout, less than half its diameter distant from horizontal through gape of small, horizontal mouth; the jaws equal as also the slender rather small, equal teeth. Preorbital rhombic, its lower border anteriorly entire, posteriorly serrate; preoperculum coarsely dentate behind, a few spines on lower margin, angular spine stout, curved, equal or much longer than eye; interoperculum small, rounded with a hindwards directed spine; posttemporal conspicuous, rounded, serrated. Nostrils close together, nearly equal, the posterior oval, anterior round with a valve. Scales spinous, strongly radiated, equal, regular, without auxiliaries, rather large on trunk, smaller on head, 5 vertical rows on operculum; lateral line arched, terminating near end of dorsal. Spinous dorsal about twice longer than soft, spines graduated to fourth, the following subequal, the last about half length of head, third anal spine about equal; postmedian rays of soft dorsal and anal produced into a blunt point. Pectorals as long as head, ventrals with the first prolonged ray surpassing vent; the spine as long as head without snout. Caudal rounded, least height of its peduncle nearly twice in head. Uniform blackish violet or brown, an ovate nacrous vertical patch below lateral line in anterior third of trunk, somewhat variable in extension; anal with white margin. Length up to 130 mm.

Habitat: Flores; Solor; Celebes (Menado, Limbe Strait); Makian; Ternate; Ceram!; Ambon!; Banda; Misol; New Guinea. — Philippines, Riu Kiu Isld., Lord Howe Isld., New Hebrides, Pelew Isld.

4. **Centropyge nox** (Blkr.).

Holacanthus nox Bleeker, Nat. Tijdschr. Ned. Indië V, 1853, p. 338. — Nat. Tijdschr. Ned. Indië XV, 1858, p. 200.

Holacanthus nox Günther, Cat. Brit. Mus. II, 1860, p. 51.

Holacanthus nox Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877, Rév. Chétodont. p. 131. — Atl. ichth. IX, 1877, p. 62.

Holacanthus nox Macleay, Proc. Linn. Soc. N. S. Wales VII, 1882, p. 244.

Holacanthus (*vroliki*?) M. Weber, Fische Siboga-Exp. 1913, p. 312.

Holacanthus nox Ogilby, Mem. Queensland Mus. V, 1916, p. 178.

Holacanthus nox Fowler, Fishes Oceania, Bishop Mus. X, 1928, p. 261.
Holacanthus nox Fowler & Bean, U. S. Nat. Mus. VIII, 1929, p. 175.
Centropyge nox Fraser-Brunner, Proc. Zool. Soc. London 1933, p. 592.

D. XV, 15—16; A. III, 16—17; L.r. 43.

Ovate, dorsal profile more convex and elevated than ventral, rostro-dorsal profile steeply ascending in a slightly convex line, ventral profile evenly but less convex from chin to anal, height 1.7—1.8 in length, head 3—3.5. Eye 3—3.2 in head, somewhat more or less than broadly convex interorbital space and little more than snout. Preorbital coarsely denticulate; preoperculum with strongly denticulate hindborder, lower border with three graduated, posteriorly directed spines, the strongest next to angular spine which is as long or longer than eye, interoperculum nearly entire. Nostrils close together, about equally wide. Scales ctenoid, coarsely striated with scattered auxiliaries; smaller on head, on cheeks and operculum conspicuous; lateral line anteriorly strongly arched, soon concurrent with profile of dorsal, terminating in middle of soft dorsal. Spinous dorsal more than twice length of soft, spines rather slender, slightly graduated, the last 1.4—1.6 in head, third anal spine of about equal length; soft dorsal acutely pointed, tenth ray the longest. reaching middle of caudal, soft anal likewise. Pectorals about as long as head; ventrals as long, their spines nearly as long as last dorsal spine. Caudal rounded, least height of its peduncle at least twice in head. Colour uniform dark brown, head and part of chest yellowish. Length 111 mm.

Habitat: Pulu Weh!; Celebes (Limbe Strait, Gulf of Boni); Ambon; Banda!; Halmahera; Goram. — Philippines, China (Hongkong), Japan (Sagami), Okinawa.

5. **Centropyge bispinosus** (Gthr.).

Holacanthus diacanthus Bleeker, Acta Soc. Sc. Indo-Neerl. II, 1857, p. 57 (nec Boddaert).
Holacanthus bispinosus Günther, Cat. Brit. Mus. II, 1860, pp. 48, 516.
Holacanthus bispinosus Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 287.
Holacanthus bispinosus Günther, Fische Südsee 1873—75, p. 51.
Holacanthus loriculus Günther, loc. cit. p. 53.
Holacanthus bispinosus Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877, Rév. Chétodont, p. 125. — Atl. ichth. IX, 1877, p. 60.
Holacanthus zebra Sauvage, Poiss. Madagascar 1891, p. 263.
Holacanthus bispinosus Steindachner, Abh. Senckenberg. Naturf. Ges. XXV, 1900, p. 421.
Holacanthus bispinosus Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII, (1903) 1905, p. 378.

Holacanthus bispinosus Jordan & Seale, Bull. Bur. Fish. XXV (1905) 1906, p. 348.
Holacanthus loriculus Jordan & Seale, loc. cit. p. 349.
Holacanthus loriculus Seale, Occas. Papers Bishop Mus. IV, 1906, p. 65.
Holacanthus potteri Jordan & Metz, Proc. U. S. Nat. Mus. XLII, 1912, p. 525.
Holacanthus bispinosus M. Weber, Fische Siboga-Exped. 1913, p. 311.
Holacanthus bispinosus Ogilby, Queensland Mus. III, 1915, p. 99.
Centropyge tutuilae Jordan & Seale Mem. Carnegie Mus. X, 1922, p. 62.
Holacanthus potteri Fowler, Bull. 22 Bishop Mus. 1925, p. 28.
Holacanthus loriculus Fowler & Ball, Bull. 26 Bishop Mus. 1926, p. 18.
Holacanthus potteri Fowler & Ball, ibidem.
Holacanthus bispinosus Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 260.
Holacanthus potteri Fowler, ibidem.
Holacanthus loriculus Fowler, loc. cit. p. 262.
Holacanthus loriculus Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 179.
Holacanthus bispinosus Fowler & Bean, loc. cit. p. 181.
Holacanthus potteri Fowler & Bean, loc. cit. p. 183.
Holacanthus bispinosus Herre, Journ. Pan-Pacific Res. Inst. VI, 1931, p. 13; VII, 1932, p. 4.
Holacanthus bispinosus Borodin, Bull. Vanderbilt Mar. Mus. I, 1932, p. 86.
Centropyge bispinosus Fraser-Brunner, Proc. Zool. Soc. London, 1933, p. 592.

D. XIV—XV, 16—17; A. III, 16—17; L.r. ± 40.

Oval, dorsal and ventral profile nearly equally convex, rostrodorsal profile convex, bulging a little opposite eye; height 1.7—1.8 in length, head 3.6—3.8. Eye 2.5—3 in head, about equal broadly convex interorbital space, somewhat greater than blunt snout, for its major part situated in anterior half of head, not far above horizontal through gape of mouth. Teeth very slender and long, equal in both jaws; vomerine teeth present. Preorbital with convex lower margin with more or less conspicuous down- and hindwardly directed spines, hindmargin not free; hindborder of preoperculum in young finely, in old strongly dentate, lower border with 1 or 2 more or less strongly hindwards directed spines, angular spine longer or shorter than eye; interoperculum small, rounded with hindwards directed spines. Nostrils small, close together, posterior oval. Spinous dorsal twice longer than soft, spines graduate, last spine about 1.5 in head, nearly equal third anal spine; soft dorsal and anal obtusely pointed. Pectorals equal head; ventrals acute, the first ray reaching anal, the spine 1.4 in head. Caudal rounded, least height of its peduncle half length of head. Ground-colour yellowish-brown in alcohol, dark brown on head, nape and dorsal part of back, trunk crossed with more or less than 20 vertical brown stripes, more or less irregular and complete, wanting on chest;

dorsal, caudal and anal black, with bluish margin, ventrals dark, pectorals yellow. Length up to 110 mm.

Habitat: Celebes (Gulf of Tomini); Talisse Isl.; Ambon!; Tidore; Ternate; Banda!; — Philippines, Madagascar, Melanesia, Polynesia.

Note. The colouration as above described is taken from specimens from the Archipelago and conform Bleeker's description; *H. potteri* Jordan & Metz differs after Fowler (1928) in its „more barred color-pattern" while „there is no valid excuse for *C. tutuilae* Jordan & Jordan". *H. loriculus* Gthr. is evidently a variety of *C. bispinosus,* having the transverse bands reduced in number and rather broad (Fraser-Brunner).

6. **Centropyge vroliki** (Bleeker).

Holacanthus vrolikii Bleeker, Nat. Tijdschr. Ned. Indië V, 1853, p. 339.
Holacanthus vrolikii Günther, Cat. Brit. Mus. II, 1860, p. 51.
Holacanthus vrolikii Klunzinger, Verh. Zool. Bot. Ges. Wien XX, 1870, p. 787.
Holacanthus vroliki Günther, Brenchley's Cruise of the „Curaçao" 1873, p. 409.
Holacanthus vroliki Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877, Rév. Chétodont. p. 132. — Atl. ichth. IX, 1877, p. 63. — Arch. Néerl. Sc. Nat. XIII, 1878, p. 45.
Holacanthus vroliki Klunzinger, Fische Roth. Meer. 1884, p. 60.
Holacanthus vroliki Steindachner, Abh. Senckenberg. Naturf. Ges. XXV, 1900, p. 421.
Holacanthus vroliki M. Weber, Fische Siboga-Exp. 1913, p. 312.
Holacanthus vroliki Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 92.
Holacanthus vroliki Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 261.
Holacanthus vroliki Duncker & Mohr, Mitt. Zool. Mus. Hamburg XLIV, 1929, p. 73.
Holacanthus vroliki Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 164.
Holacanthus vroliki Herre, Journ. Pan-Pacific Res. Instit. VI, 1931, p. 7.
Centropyge vrolicki Fraser-Brunner, Proc. Zool. Soc. London 1933, p. 593 1).

D. XIV, 15—16; A. III, 16—17; L.r. 46—48.

Oblong-ovate, rostro-dorsal more steep than convex rostroventral profile, both elevated; height 1.6—2 in length, head 3.6—3.9; snout blunt, small, almost horizontal; jaws about even; teeth slender, equal. Eye 2.5—3.5, according age, equal to 1.2 in strongly convex interorbital space. Preorbital conspicuously serrate; preoperculum with strongly dentate hindborder; angular spine longer

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1) This species in 1853 named by Bleeker for the celebrated comparative anatomist of Amsterdam, Prof. W. Vrolik and therefore wrongly spelled Vrolicki.

or shorter than eye, before it some spines, one next about 1/4 its length; interoperculum small, 2 or more sharp spines posteriorly; posttemporal rounded, serrated. Nostrils rounded, of equal size. Scales large, ctenoid, striated, regular, with a few scattered small auxiliaries, on head and chest not much smaller, on operculum in five vertical rows; lateral line not much arched, terminating at end of dorsal. Spinous dorsal twice or somewhat less longer than soft; spines rather high and slender, the median scarcely higher than the sequent, about as long as head without snout; third anal spine equal; soft dorsal and anal rounded posteriorly. Pectorals equal to length of head; ventrals with the first ray prolonged, reaching anal. Caudal rounded, least height of its peduncle twice in head. Uniform grayish brown, darker posteriorly, especially on median fins, scales on trunk and tail anteriorly with a narrow light spot, less conspicuous on head; paired fins and caudal brown. Length up to 127 mm.

Habitat: Flores; Timor; Celebes (Limbe Strait, Gulf of Boni); Talisse Ild.; Togian Islds.; Tidore; Buru; Batjan; Halmahera; Obi major; Banda!; Ambon; Ceram; New Guinea. — Red Sea, Philippines, Formosa, St. Matthias, Solomon Ilds.

4. Subfam. ZANCLINAE.

Much compressed, dorso-ventrally oval, much elevated, covered by minute ciliated scales, nearly invisible to the naked eye; lateral line strongly arched, concurrent with the dorsal profile. Head short with a greatly produced tubular snout. Eye lateral, high up, with or without a pair of interorbital protuberances before eye, increasing with age into two osseous bones. A pair of approximate nostrils on each side before eye. Mouth small, terminal with produced jaws, not protractile, lacking a supramaxillary bone. Teeth elongate, simple, setiform, much projecting. Preorbital with or without a small recurved spine about angle of mouth. Opercular apparatus not armed. Branchial aperture a short slit extending between the level of the eye and of the mouth, separated from its opposite by the high, rounded, extensive preventral region, brought about by the largely developed coracoid and cleithrum and their musculature. The isthmus is therefore not differentiated from the preventral integument and the four (five) branchiostegals are concealed. The continuous dorsal fin, with a strongly concave hindborder, has in its spinous part the two anterior spines very short and pungent, the five succeeding are flexible and prolonged, the third into a long filament. Anal with three spines, the extensive soft-rayed part with a nearly vertical hindborder. Pectorals rounded, shorter than head. Ventrals inserted below base of pectorals with a spine and five rays, the first of which is somewhat produced; no axillary scale-like process. Caudal emarginate. Number of vertebrae reduced to 9 + 13 = 22.

Distribution: that of the single genus known.

Note: This is probably an aberrant form of the Chaetodontidae characterized by anatomical peculiarities as the reduction of the vertebral column, the enormous expansion of the coracoid and cleithrum forming a thoracal cuirass.

1. **Zanclus** Cuvier & Valenciennes.

(Cuvier & Valenciennes, Histoire nat. Poissons VII, 1831, p. 102).
Gnathocentrum Guichenot, Ann. Soc. Maine et Loire IX, 1866, p. 4.

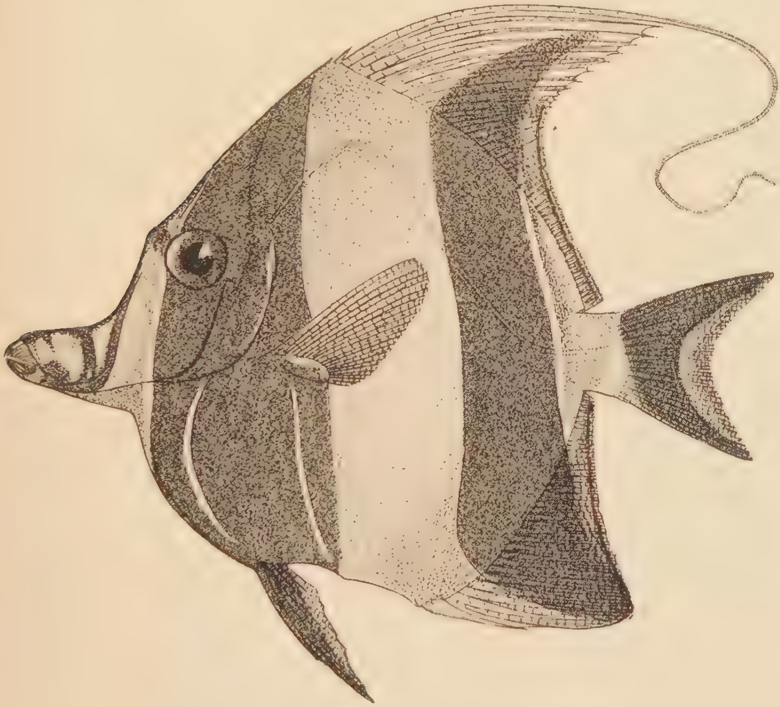

Fig. 43. *Zanclus cornutus* (L.) juvenis × 4/5.

For the characters of the single genus known see those of the subfamily.

Distribution: From the southern and eastern coast of

Africa through the Indic and Pacific till the Revillagigedo Archipelago. Small fishes living in sea, one species in costal water and on coral reefs, the other probably pelagic.

Key to the indo-australian species of Zanclus.

I. In adolescent a pair of interorbital protuberances developing in adult to a pair of osseous spines or horns . . . . , 1. *Z. cornutus* p. 170.
II. No interorbital protuberances but at angle of mouth a small recurved spine of preorbital bone 2. *Z. canescens* p. 172.

1. **Zanclus cornutus** (L.). (Fig. 43 and 44).

Chaetodon cornutus Linnaeus, Systema nat. ed. Xa 1758, p. 273.
Chaetodon cornutus Bloch, Ausl. Fische III, 1802, p. 72. — Bloch, Schneider, Syst. ichth. 1801, p. 221.
Zanclus cornutus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 102.
Zanclus cornutus Bleeker, Chaetodont. p. 22, Verh. Batav. Gen. XXIII (1849) 1850.
Zanclus cornutus Peters, Monatsber. Akad. Berlin 1855, p. 438.
Zanclus cornutus Montrouzier, Ann. Sc. phys. Soc. d'Agriculture Lyon (2) VIII 1856, p. 445.
Zanclus cornutus Günther, Cat. Brit. Mus. II, 1860, p. 493.
Zanclus cornutus Playfair, in Playfair & Günther, Fish. Zanzibar 1866, p. 65.
Zanclus cornutus Günther, Fische Südsee 1876, p. 142.
Zanclus cornutus Bleeker, Rév. Chaetodont. p. 167, Verh. Akad. Amsterdam XVII, (1876) 1877. — Atl. ichth. IX, 1877, p. 77.
Zanclus cornutus Day, Fish. India 4° 1878—1888, p. 111.
Zanclus cornutus Lütken, Spolia Atlantica, Vidensk. Selsk. Skr. (5) XII, 1880, p. 558.
Zanclus cornutus Macleay, Descr. Cat. Austr. Fish. I, 1881, p. 183.
Zanclus cornutus Jordan & Evermann, Fish. North & Middle America II, 1898, p. 1687.
Zanclus cornutus Jordan & Mc Gregor, U. S. Comm. Fish. Fisheries XXIV, 1899, p. 280.
Zanclus cornutus Waite, Mem. Austr. Mus. III, 1899, p. 545.
Zanclus cornutus Steindachner, Abh. Senckenberg. Naturf. Ges. XXV, 1901, p. 421.
Zanclus canescens Seale, Occan. Papers Bishop Mus. I, 1901, p. 102. (nec L.).
Zanclus canescens Jordan & Fowler, Proc. U. S. Nat. Mus. XXV, 1902, p. 549 (nec. L.).
Zanclus canescens Jordan & Evermann, Bull. U. S. Fish Comm. XXIII, (1903) 1905, p. 382 (nec. L.).
Zanclus cornutus Jordan & Richardson. Bull. Bur. Fish. XXVII. (1907) 1908, p. 269.
Zanclus cornutus M. Weber, Siboga-Exp. Fische 1913, p. 325.
Zanclus cornutus D. S. Jordan & E. K. Jordan, Mem. Carnegie Mus. X, 1922—1925, p. 64.
Zanclus canescens Barnard, Ann. S. Afric. Mus. XXI, 1925—27, p. 782 (p.p.).
Zanclus cornutus Herre, Philippine Journ. Sci. XXXIV, 1927, p. 473.

Zanclus canescens Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 263 (p.p.).
Zanclus cornutus Dunker & Mohr, Mitt. Zool. Mus. Hamburg XLIV, 1929, p. 74.
Zanclus canescens Fowler & Bean, Bull. U. S. Nat. Mus., vol. 8, 1929, p. 196 (p.p.).
Zanclus cornutus Borodin, Bull. Vanderbilt Marine Mus. I. art. 3. 1932, p. 87.

D. VII, 40—41; A. III, 31—35.

Body strongly compressed, dorso-ventrally much elevated, oval; anterior profile above and below conical produced snout concave. Height about 1.25 in length, head 2.25—2.50. Eye 4.5 to nearly 5 in adult. Supraorbital ridge serrate in young, developing in adolescent an osseous protuberance which in adult forms on each side of concave interorbital space a pointed horn. The conical snout strongly projecting beyond anterior profile, about 1,5 in length of head, its upper profile concave, the jaws much produced, equal. Teeth long, slender, pointed, much produced, usually in a single series. First and second dorsal spine short, stout, pungent, third exceedingly elongate, filamentous, as long as or much longer than length of body, the four succeeding successively much shorter; dorsal rays rapidly diminishing in heigth, forming a concave hindborder. The two anterior anal spines short, third nearly thrice in head; soft anal shorter than soft dorsal with a nearly straight hindborder. Caudal truncate or slightly rounded with acute angels. Pectorals acutely-rounded, shorter than head. Ventrals with the first ray produced. Colour yellow with two broad black or brown cross-bands; the anterior getting broader inferiorly, reaching with its hindmargin from origin of dorsal fin through base of pectoral to

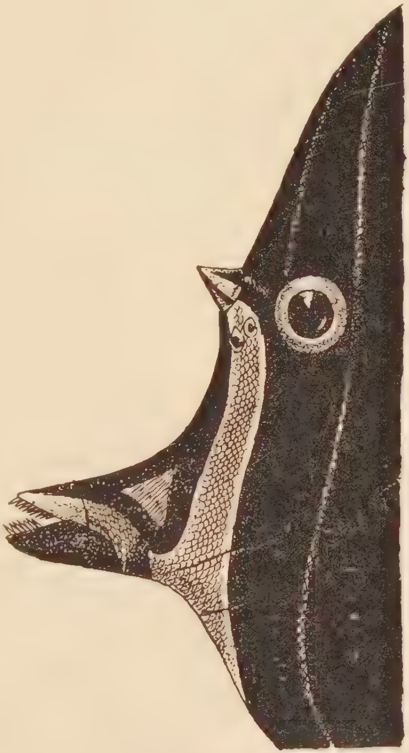

Fig. 44. *Zanclus cornutus* (L.) adult n. s.

anus; its frontmargin includes the eye; the narrower posterior band extends from soft dorsal to top of soft anal, its hindmargin is bordered by a blue line, three similar more or less curved blue, in alcohol whitish, lines are present on anterior band; caudal nearly totally occupied by a broad black crossband, anteriorly and posteriorly bordered by a blue and white or pearl-coloured margin. A brown or black band from interorbital space to tip of snout, connected with a similar curved band inclosing a triangular spot of the ground colour, mandibula and ventrals blackish, pectorals, dorsal and anal yellowish brown, the two last with a dusky hindmargin in adult. Length up to 200 mm.

Nomen indig.: Gayam (Malay. Batavia).

Habitat: Pulu Weh!; Sumatra (Benkulen, Ulakan, West coast Atjeh!); Batu Isl.; Java (Batavia!, Prigi, Patjitan); Cocos Isl.; Borneo [Herre]; Flores!; Timor; Celebes (Badjoa, Menado, Tanawanko); Saleyer!; Sangir Isl. [Herre]; Haruku; Banda!; Goram Arch.; Misool; Waigeu; Kisser!; Binongka!; Ternate; Halmaheira; Batjan; Ceram; Ambon!; New Guinea (Geelvink Bay!, Kajo Bay!). — East coast Africa (Zanzibar, Mossambique, Natal-Coast till Mossel Bay), Bourbon, Mauritius, British India, Southern Japan, Phillippines, Marianas, New Pommern, St. Matthias Isl., Solomon Isl., Woodlark, Hawiian Isl., Alice Isl., Society Isl., Samoa 1). In Sea.

2. **Zanclus canescens** (L.). (Fig. 45).

Chaetodon canescens Linnaeus, Syst. nat. edit. Xa 1758, p. 272.
Chaetodon canescens Bloch, Schneider, Syst. ichth. 1801, p. 215.
Pomacanthus canescens Lacépède, Hist. nat. Poiss. IV, 1803, p. 517.
Zanclus centrognathus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 102.
Zanclus Montrouzieri Thiollière in Montrouzier, Ann. sc. phys. Soc. d'Agriculture Lyon (2) VII, 1836, p. 446.
Zanclus canescens Günther, Cat. Brit. Mus. II, 1860, p. 493.
Gnathocentrum centrognathum Guichenot, Ann. Soc. Maine & Loire IX, 1866, p. 4.
Zanclus cornutus Günther, Fische Südsee 1876, p. 142 (p.p.).
Zanclus canescens Bleeker, Rév. Chaetodont. p. 169, Verh. Akad. Amsterdam XVII, (1876) 1877. — Atl. ichth. IX, 1877, p. 78.
Zanclus ruthiae Bryan, Occas. Papers, Bishop Mus. II, 1906, p. 276.
Zanclus canescens M. Weber, Siboga Exp. Fische, 1913, p. 325.

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1) Dr. A. W. Herre kindly informed us, that the specimens, described by Jordan & Mc Gregor from the Revilla Gigedo Archipelago, belong to this species.

Zanclus ruthiae D. St. Jordan & E. K. Jordan, Mem. Carnegie Mus. X, 1922-1925, p. 64.
Zanclus canescens Barnard, Ann. S. Afric. Mus. XXI, 1925—27, p. 783. (p.p.).
Zanclus canescens Herre, Philippine Journ. Sci. XXXIV, 1927, p. 472.
Zanclus canescens Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 263. (p.p.).
Zanclus canescens Fowler & Bean, Bull. U. S. Nat. Mus. vol. 8, 1929, p. 196 (p.p.).
Zanclus canescens Borodin, Vanderbilt Marine Mus. I, art. 3, 1932, p. 87.

D. VII, 40—41; A. 32—35.

Height almost equal to length, head more or less than 2.5 in length. Dorso-rostro-ventral profile more rounded, as the snout is less prominent, than in specimens of equal length of Z. cornutus. Interorbital space convex, equal to diameter of eye, without any protuberances or indication of a pair of horns. Preorbital bone above the corner of the mouth with a conical recurved small spine. General character of fins similar to that of Z. cornutus. Colour much like that of Z. cornutus, but the fronto-maxillary band with its characteristic triangular patch is lacking, the dorsal and anal fins are also brownish. Length up to 80 mm.

Habitat: Flores!; Celebes (Menado); Karkaralong Isl.!; Ceram!; Ambon; Rotti Isl.! New Guinea. — Eeast-coast of Southern Africa, Philippines, Woodlark Isl., Hawaii, Society Isl. (Herre, Borodin). In sea.

Note. There is much doubt and much misunderstanding about the validity of this species and the differences between *Zanclus cornutus* and *canescens*. It is an often pronounced opinion that the latter is the young of *cornutus*. This species has on each side above the eye an osseous spine or horn, not a single „median horn" as Jordan & Evermann write (Fish. North and Middle America, 1898, p. 1687). They are usually called praeorbital or frontal, and develope in adolescence from the supraorbital ridge, serrated in the young, and are fully developed in the adult. These horns or any indication of them are lacking in *canescens,* which has in return on each side above the angle of the mouth a recurved spine, developed from the preorbital bone and therefore also called preorbital and sometimes confused with the interorbital pair of horns or spines of the adult *cornutus*. Bleeker used this preorbital recurved spine of *canescens* to distinguish it from *cornutus;* he does not speak of a *„praeopercular"* spine, as Jordan & Evermann l.s.c. p. 1688 wrongly say. A preopercular spine does not exist in either of the two species. The statement of Jordan & Fowler (l. s. c. 1902) is again misleading. This is also the case with the publication of Fowler & Bean (U. S. Nat. Mus. vol. 8, 1929, p. 198), who unite *Z. canescens* (L.) and *Z. cornutus* (L.) under the name of *canescens* as having page precedence by Linnaeus, asserting, that they differ in no important way save for their paler and bleached coloration. The four examples they have seen are like Bleeker's and range from 65—70 mm. in length. Our description and figures show that besides the difference in size there are other important differences to separate them. Günther knew these differences between the two species, as is explicitely stated in his Catalogue II, 1860, but he neglected it in his article about *Zanclus* in „Fische der Südsee 1876" Here he accepts only *cornutus* and is of opinion, that canscens is the *Acronurus*-stage of the first named, being as he writes, extremely similar to the young of *Acanthurus*, a similarity which continues till the fish is 2½ in. long. „In diesem Stadium wurde der Fish als eine besondere Art (Z. canescens) beschrieben." This hypothesis seems very improbable. In the first place would it be an unknown long duration of the *Acronurus*-stage, which in *Acanthurinae*, as far as we know, is lost at a length of 30—38 mm., while specimens of *canescens* of 70—80 mm. length are described by Valenciennes, Bleeker, Lütken and M. Weber. In the second place we do not know of *Acronuri* characterized by a preorbital spine, the specific character of *canescens*, a fact neglected by Günther and later authors. Moreover Bleeker remarks: „Je possède une belle série d'individus du cornutus de parfaitement la même taille que mes trois exemplaires du canescens,

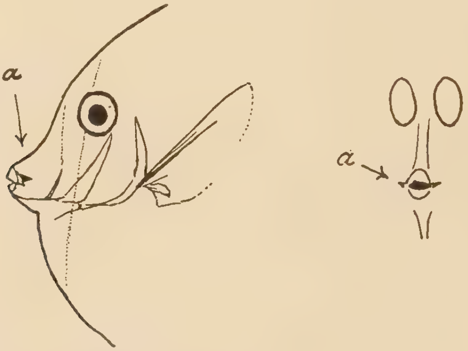

Fig. 45. Sketch of head and mouth of *Zanclus canescens* (L.) showing in a the small recurved preorbital spine at angle of mouth, n. s. Kindly forwarded by Dr. G. Duncker.

ce qui a permis de bien juger des différences spécifiques." The assertion of Barnard (l. s. c. p. 783) in his diagnosis of the single species he describes of Zanclus: „Praeorbital with a recurved spine above the angle of the mouth in some young examples (canescens), absent in others, but always obsolete in old." decides nothing about the validity of *canescens*. The only conclusion is that no specimens of *canescens* above 80 mm. length are known. This assuption seems to be made uncertain by the assertion of Bleeker: „j'ai vu bon nombre d'individus du canescens, provenant de localités incertaines et en partie plus grands que ceux de mon cabinet, au Muséum d'histoire naturelle de Hambourg." But this must be a slip of memory, for Dr. G. Duncker kindly informs us, that the 4 specimens of *canescens*, probably from New Guinea and determined by Bleeker as *Z. centrognathus* C. V. are 60—70 mm. long. The sketch in Fig. 45 kindly fortwarded by Dr. Duncker, shows them to belong to *canescens*. The about 30 specimens of *cornutus* in the Hamburg Museum have a length of 68 to about 200 mm. The only fact that remains is, that *canescens* is much rarer than the quite common *cornutus*, which frequents the shore-water and the coral-reefs and is easy to catch, while *canescens* is probably of a more pelagic habit, as is also the opinion of Cuvier & Valenciennes who got a specimen extracted by Dussumier from the stomach of a *Coryphaena*, caught near the equator at 1° lat. north 75° long. east from Paris. In case there is any doubt about the valididy of the Linnean name *canescens*, the species ought to be named *centrognathus* C. V.

5. Subfam. EPHIPPINAE.

Body strongly compressed, elevated, nearly orbicular, covered by moderate-sized smooth scales, smaller on head, extending on soft dorsal, anal and caudal; lateral line angularly arched, with simple small, sensory tubes. Head much shorter than high, densely and irregularly covered with scales, wanting only on the broad serrated posterior and inferior limb of preoperculum, which otherwise has five to seven transverse series of scales and in the neighbourhood of the mouth. Two nostrils on each side, a larger posterior in form of a narrow slit before middle of eye and an approximate rounded anterior nostril, situated somewhat lower. Mouth very small, terminal, nearly horizontal, not protactile; jaws with bands of setiform teeth; palate toothless; six branchiostegals; gillmembranes broadly attached to isthmus. Dorsal deeply emarginate with ten spines, the first small and procumbent, their membrane deeply incised till base of fin or nearly so. Anal with three spines, its soft part similar to soft dorsal, both are rounded and posteriorly decreasing in height. Caudal obtuse, rounded in middle, somewhat emarginate above inferior and below superior prominent angel. Pectorals small, rounded; ventrals acute with a rather long spine surpassed by the prolonged filiform first ray, and with an axillary scaly process.

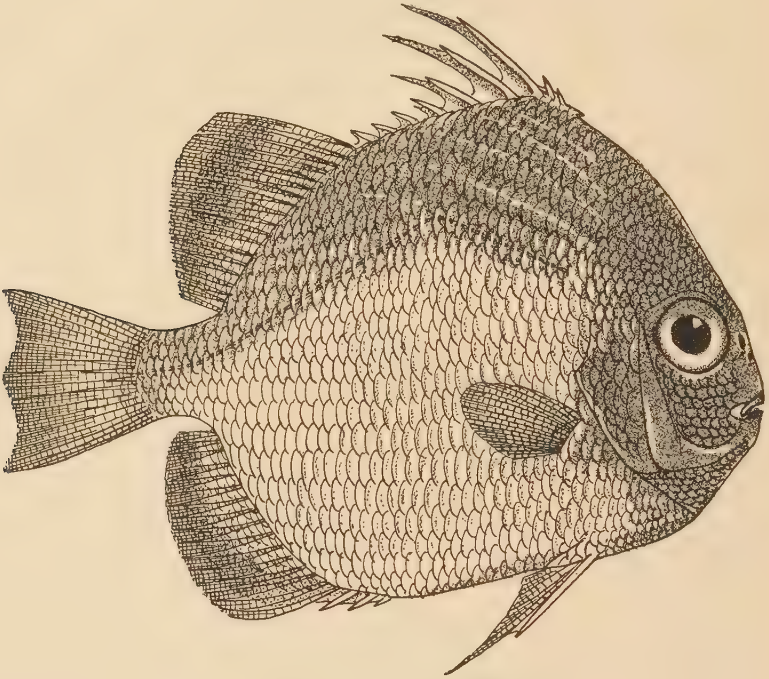

Fig. 46. *Ephippus orbis* (Bloch). × 4/5.

Distribution: Marine fishes of medium size, occurring in the Indic from the coasts of British India, through the western part of the Archipelago, to China, Formosa and the Philippines. The related tropical Atlantic forms are separated as *Chaetodipterus* Lac.

1. **Ephippus** Cuvier.

(Cuvier, Règne, animal II, 1817, p. 335 (p.p.).

Ilarches Cantor, Journ. Asiatic. Soc. Bengal XVIII (1849) 1850, p. 1142.

For characters and distribution of the single genus known, see those of the subfamily.

1. **Ephippus orbis** (Bl.). (Fig. 46).

Chaetodon orbis Bloch, Ausl. Fische. III, 1788, p. 81. — Bloch, Schneider, Syst. ichth. 1801, p. 232.
Chaetodon orbis Lacépède, Hist. nat. Poiss. IV, 1802, pp. 458, 491.
Chaetodon orbis Shaw, Gen. Zool. IV, 1803, p. 339.
Ephippus orbis Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 96.
Ephippus melanopus Bleeker, Nat. Geneesk. Arch. Ned. Indië (3) II, 1845, p. 520. — Chaetodont. p. 22. Verh. Batav. Gen. XXIII (1849) 1850. (name only).
Ephippus orbis Bleeker, ibidem.
Ilarches orbis Cantor, Journ. Asiat. Soc. Bengal XVIII (1849) 1850, p. 1142.
Ephippus orbis Günther, Cat. Brit. Mus. II, 1860, pp. 62, 518.
Ilarches orbis Bleeker, Ned. Tijdschr. Dierk. IV (1871) 1872, p. 140. — Chétodont. p. 24, Verh. Akad. Amsterdam XVII (1876) 1877. — Atl. ichth. IX, 1877, p. 20.
Ephippus orbis Day, Fish. India 4°, 1878—88, p. 115.
Ilarches orbis Jordan & Evermann, Proc. U. S. Nat. Mus. XXV, 1902, p. 356.
Ephippus orbis Pellgrin, Bull. Soc. Zool. France XIII, 1905, p. 84.
Ephippus orbis Seale, Philipp. Journ. Sci. V, 1910, p. 282.
Chaetodipterus orbis Barnard, Ann. S. Afric. Mus. XXI 1925—27, p. 602.
Ephippus orbis Herre & Montalban, Philipp. Journ. Sci. XXXIV, 1927, p. 11.
Ephippus orbis Fowler & Bean, Bull. U. S. Nat. Mus. vol. 8, 1929, p. 25.

D. (I procumbent) IX, 19—20; A. III, 15—16. Sq. lat. 35—38.

Much compresed, nearly orbicular, profile from throat to dorsal fin about semicircular, height between ventral and dorsal 1.3, 1.6 in length with caudal; head 3 to 3.5, 4 to 4.3 in length with caudal, much higher than long. Eye more or less than 2.3 in head. Lateral line angularly arched with more or less than 40 sensory scales; about eight to ten scales in a transverse series between lateral line and origin of dorsal, and 14 between lateral line and origin of anal; about five above the top of the lateral line. Dorsal with the first spine very small and procumbent, in old specimens hidden. The second and third spines small, the fourth, fifth and sixth the longest, gradually decreasing in size, their deeply incised membrane with a filiform prolongation; the succeeding spines short but strong; the soft dorsal rounded, and similar to anal, which has three spines, much shorter than eye. Pectorals obtusely rounded, longer than half length of head and about equal to spines of ventrals the first ray of which reaches anal. For other characters see those of the subfamily. Colour greenish above, the sides and belly silvery; the fins in alcohol yellowish, more or less dusky in their marginal part; the ventrals sometimes brown or blackish. Length up to 190 mm.

Nomen indig.: Patipo (Malay, Batavia).

Habitat: Penang; Singapore, Pulo Tioman!; Banka; Sumatra (Priaman); Java (Batavia!); Borneo (Sandakan). — Natal, Britsh India, Ceylon, Andamans, Malay Peninsula, Tonkin, China, Formosa, Philippines.

6. Subfam. DREPANINAE.

Strongly compressed, rhombic, much elevated below dorsal fin; covered with medium-sized finely ciliated scales, extending on dorsal and anal fin, becoming smaller on head and fins; lateral line strongly arched, with simple sensory tubes. Head shorter than high, with a parabolic profile. Two nostrils on each side, the larger posterior a narrow slit before lower half of eye, the round anterior

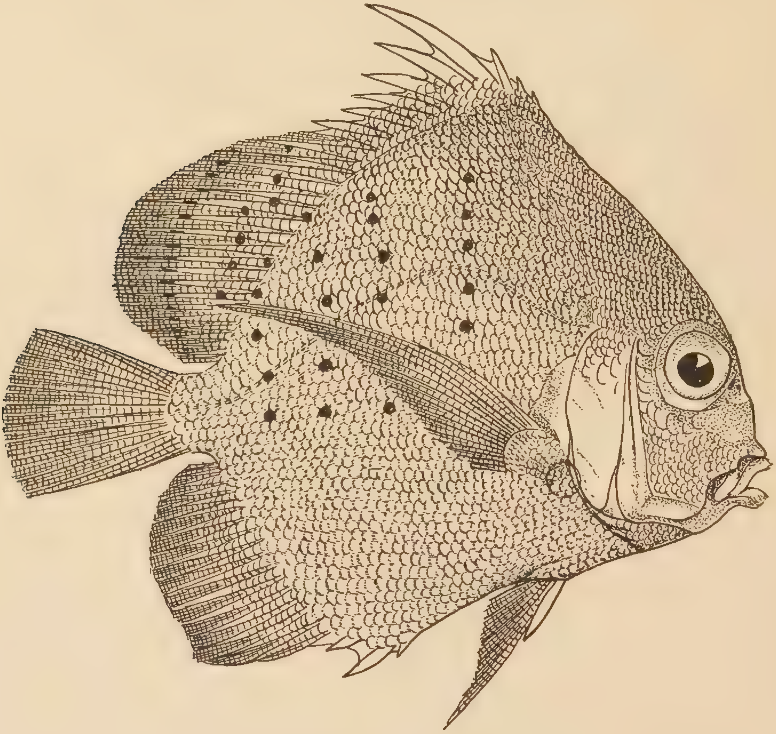

Fig. 47. *Drepane punctata* (L.).

approximate. Preorbital region naked as also the broad preopercular limb, the lower border of which is denticulate, more conspicuous in young; operculum scaly only at its top. Mouth small, terminal, protractile into a downward directed tube. Maxillary distally exposed, when mouth is closed. Jaws with bands of small setiform teeth, palate toothless. Six branchiostegals, gillmembranes broadly attached to isthmus, pseudobranchiae present; gillrakers 10 on lower part of anterior arch. Dorsal deeply emarginate with ten spines, the first procumbent, small, visible only in young, the following spines strong, heteracanth with deeply notched interspinous membrane, depressible in a high basal scaly sheath. Anal with three depressible spines, soft dorsal and anal high, rounded. Caudal with 17 principal rays, rounded. Pectorals long, falcate with a naked coracoid bone and denticulate suprascapulare; ventrals with a strong spine and five rays, the first of which is prolonged; an inguinal scaled process present.

Distribution: These fishes, represented only by one genus and species, attaining a length of over 300 mm. are common foodfish much valued by the natives, living in sea but entering also the brackish water of estuaries; distributed over the indo-pacific region from the Red Sea and East coast of Africa to China, Philippines, Australia and getting scarcer eastward to Samoa. It occurs also on the tropical West coast of Africa southwards to Angola.

1. **Drepane** Cuvier & Valenciennes 1).

(Cuvier & Valenciennes, Hist. nat. Poissons VII, 1831, p. 97).

Depranichthys Bonaparte, Giornale Arcadico 1832, p. 172.
Harpochirus Cantor, Journ. Asiat. Soc. Bengal XVIII (1849). 1850, p. 1143.

For characters and distribution of the single genus known see those of the subfamily.

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1) According to Jordan (Genera of Fishes II, 1919, p. 175) the name *Drepane* of Cuvier & Valenciennes is „preoccupied by *Drepane* or *Drepana* Schranck, Lepidoptera 1802". This quotation is not correct, as Schranck (Fauna Boica II, 2, 1802, p. 155) only used Drepana. The name Drepan*e* existed, besides as used by Cuvier & Valenciennes for a fish, only in the problematic derivation „δρεπάνη" of Agassiz (Zeller) Lepidopthera p. 22. — Jordan (Classification of Fishes 1923, p. 205) cites therefore *Drepanichthys* Bonaparte (Giorn. Arcad. LII, 1831, p. 172) as a subatitute for Drepane. We don't see the necessity of this substitution, far less than f. i. to maintain the family names Menidae and Maenidae.

1. **Drepane punctata** (L) (Fig. 47).

Chaetodon punctatus Linnaeus, Syst. nat. ed. Xa, 1758, p. 273.
Chaetodon longimanus Bloch Schneider, Syst. ichth. 1801, p. 229.
Chaetodon falcatus Lacépède, Hist. nat. Poiss. IV, 1802, pp. 452, 470.
Chaetodon punctatus Shaw, Gen. Zool. IV, 1803, p. 365.
Ephippus falcatus Cuvier, Règne Anim. ed: Ia p. 335.
Drepane punctata Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 132.
Drepane longimana Cuvier & Valenciennes, l. c. p. 133.
Drepane punctata Richardson, Ann. Mag. Nat. Hist. X, 1842, p. 28.
Drepane punctata Bleeker, Nat. & Geneesk. Arch. Ned. Ind. (3) II, 1845, p. 520 (name only).
Drepane longimana Bleeker, ibidem (name only).
Drepane punctata Richardson, Report. Ichth. China in Rep. Brit. Assoc. (1845) 1846, p. 244.
Drepane longimana Richardson, l. c. p. 245.
Drepana longimana Bleeker, Chaetodont. p. 18, Verh. Batav. Gen. XXIII, (1849) 1850, p. 23.
Harpochirus punctatus Cantor, Journ. Asiat. Soc. Bengal XVIII, 1850, p. 1144.
Harpochirus longimanus Cantor, l. c. p. 1145.
Drepane punctata Günther, Cat. Brit. Mus. II, 1860, p. 62.
Harpochirus punctatus Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 148.
Drepane punctata Kner, Novara-Exp. Fische 1865—67, p. 107.
Deprane punctata Playfair in Playfair & Günther, Fish. Zanzibar 1866, p. 39.
Cryptosmilia luna Cope, Suppl. some new spec. of Americ. & Afric. fish. Trans. Americ. Philos. Soc. XIII, 1867, p. 401.
Drepane punctata Klunzinger, Arch. Naturgesch. XXXVIII, 1872, p. 24.
Drepane punctata Günther, Fische Südsee, 1873—75, p. 55.
Drepana punctata Day, Fish. India 4°, 1878—88, p. 116.
Harpochirus punctatus Bleeker, Chétodont, p. 21, Verh. Akad. Amsterdam XVIII (1876) 1877. — Atl. ichth. IX, 1877, p. 19.
Drepane punctata Klunzinger, Sitzb. Akad. Wien 1880, p. 363.
Drepane punctata Macleay, Descr. Cat. Austral. Fish. I, 1881, p. 97. — Proc. Linn. Soc. N. S. Wales VII, 1882, p. 244.
Drepane punctata Rutter, Proc. Acad. Nat. Sci. Philadelphia 1897, p. 78.
Harpochirus longimanus Fowler, Journ. Acad. Nat. Sci. Philadelphia (2) XII, 1904, p. 544.
Drepane punctata Jordan & Seale, Bull. Bur. Fish. XXVI (1906) 1907, p. 33.
Drepane punctata Gilchrist & Thompson, Ann. S. Afric. Mus. VI, 1908, p. 162.
Drepane punctata et var. *longimana* Pellegrin, Bull. Soc. Zool. France XXXIV, 1914, p. 227. — Ann. Inst. Océanogr. VI, 1914, p. 57 (var. africana Osorio).
Drepana punctata Mc Culloch, Biol. Result. „Endeavour" IV, 1916, p. 190.
Harpochirus longimanus Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, p. 54.
Drepane punctata, Hora, Mem. Asiat. Soc. Bengal, VI, 1924, p. 490.
Drepane punctata Vinciguerra, Ann. Mus. Civ. Genova (3) X, 1926, p. 568.
Drepane punctata Barnard, Ann. S. Afric. Mus. XXI, 1925—27, p. 601.
Drepane punctata Evermann & Shaw, Proc. Calif. Acad. Sci. (4) XVI, 1927, p. 117.

Drepane punctata Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927, p. 3.
Drepane longimana Herre & Montalban, l. c. p. 5.
Drepane punctata Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 242.
Drepanichthys punctatus Mc Culloch, Check-List Fishes Australia, Austral. Mus. Sydney 1929, p. 243.
Drepane punctata Fowler & Bean, Bull. U. S. Nat. Mus. vol. 8, 1929, p. 27.
Drepane longimana Herre, Notes Fish. Zool. Mus. Stanford Univ. I, 1931, p. 58.
Drepane punctata Herre, ibidem.

D. VIII—IX, 19—22; A. III, 17—18; L. l. 50—55.

Rhombic, much elevated, rostro-dorsal profile gently convex, with a slight concavity before dorsal fin, dorsal profile descending very steep from origin of dorsal to caudal peduncle. Height slightly more than length; head 2.8 to 3 in length, much higher than long. Eye 3 to 3.5 in head, situated near anterior profile, in anterior half of head, far above mouth. Fourth dorsal spine the longest, slightly shorter than head; soft dorsal strongly rounded. First anal spine minute, the third somewhat shorter than second, which equals about diameter of eye. Caudal rounded. Pectorals long, falciform, reaching base of caudal; ventrals with a strong spine, their first ray produced, reaching anal spines. For other characters see those of the subfamily. Colour greyish on back, otherwise silvery, usually with 4 to 10 transvers series of dark spots, sometimes extending on soft dorsal; these series may be represented by dark narrow or alternating bands, more pronounced in young specimens, or the spots and crossbars are wanting and the colour uniform. Length up to 300 mm.

Nomen indig. Kettang-Kettang, Tapi-Tapi, Kiper-laut (Malay. Java); Kiper, Tebèl, Taweh (Javan. and Madura); Papatik (Sundan.); Dajong-Dajong (Bandjermasin, Borneo); Dabie (Balikpapan, Borneo).

Habitat: Penang; Singapore; Pulu Tioman!; Pulu Ani!; Riouw Arch.; Banka; Nias; Sumatra (Telokbetong, Rokan, Trussan, Padang, Ulakan, Priaman, Siboga, Palembang, Benkulen); Java (Batavia!, Tjilatjap, Besuki!, Samarang, Surabaja, Probolingo!, Pasaruan, Japara); Pulu Kendal!; Madura!; Bali; Borneo (Sambas, Penangkat, Sampit, Kakajau, Bandjermasin, Sandakan, Serawak); Celebes (Makasser!, Bulukomba, Badjoa, Menado); Sanana!; Halmaheira; Batjan; Buru; Ambon; Waigeu; New Guinea (Fak-Fak!). — Red Sea, East coast of Africa (Chinde, Delagoa Bay, Natal), Madagascar, South Arabia, Muscat, Persian Gulf, British India, Ceylon, Andamans, Malay Peninsula, Siam, China, Formosa, Philippines, Australia (West coast, Northwest coast, Queensland), New Ireland, Samoa. West coast of Africa southwards to Angola.

In sea and brackish water of estuaries.

Note. The three colour varieties are represented everywhere in the extensive region of their habitat. The striped form is described as *Dr. longimana* (Bloch) and by some authors considered as a distinct species, but no external characters besides the difference in colour, can be assigned to distinguish the two forms. It is true that Herre & Montalban (l. s. c.) state, that in *Dr. punctata* the airbladder has two pairs of lateral caeca, the posterior very long, in *Dr. longimana* about 15 pairs of much-branched lateral caeca, but Cuvier & Valenciennes declare about *Dr. longimana:* „La vessie aérienne est de même forme que dans le précédent (Dr. punctata) ; son corps est plus gros et ses cornes sont un peu plus courtes". So this anatomical difference may be of an individual character.

7. Subfam. PLATACINAE.

Greatly compressed, rhombic, much elevated, about as high as long, much changing with age and by variation. Scales ctenoid, small, becoming minute on head, the sides and lower region of which they cover as also the median fins. Lateral line complete, arched. Head exceedingly high and short with a semicircular or angular profile. Eye lateral, about in middle of head. Two somewhat distant nostrils on each side, the posterior more slitlike, immediately before eye, the anterior circular, with a rim, somewhat lower. Mouth small, horizontal, not protractile, maxilla distally exposed. A band of small, tricuspid, movable teeth in jaws; none or only a few on vomer. Six branchiostegals; pseudobranchiae present. Gillmembranes broadly united with isthmus, the scaly integument of which is continued without fold in the prothoracal integument which forms a scaly prominence at the base of the ventrals. Dorsal not notched, spinous dorsal not differentiated from soft part; the five to seven 1) spines increasing in length posteriorly and are more or less hidden by the scaly

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1) This number increases to nine in *Platax novemmaculeatus* Mc Culloch (Biol. Results „Endeavour" IV, 1916, p. 188) from Queensland. Whitley (Mem. Queensland Mus. X, part I, 1930, p. 17) has placed this species in a new genus Zabidius), while Barnard takes it for a *Chaetodipterus*.

covering of the dorsal. Anterior rays of dorsal and anal greatly prolonged in young (Fig. 48), decreasing with growth; in adult the posterior rays much shorter. Three anal spines, the third much the longest. Caudal truncate or emarginate. Pectorals short; ventrals with a strong spine and five rays, the anterior prolonged rays becoming shorter with age.

1. **Platax** Cuvier.

(Cuvier, Règne Annival II, 1817, p. 334)

For characters of the single genus known see those of the family.

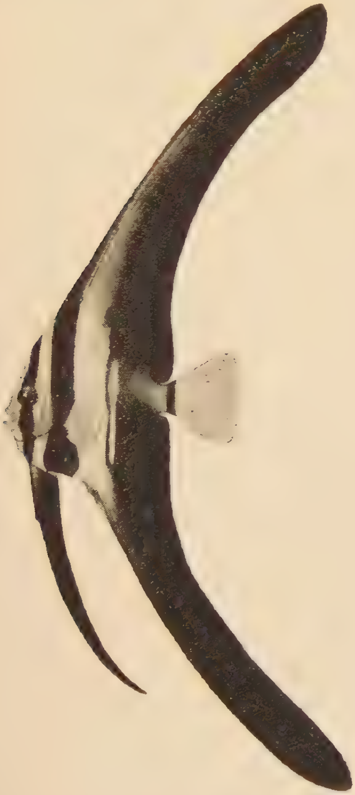

Fig. 48. *Young Platax* with prolonged dorsal, anal and ventral fins × ½. After Delsman & Hardenberg.

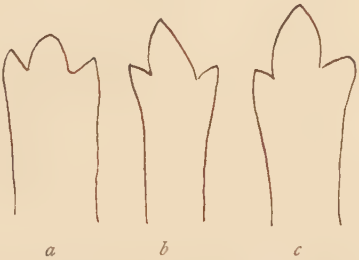

Fig. 49. Teeth of a *Platax teira* (Forsk.), b *Pl. orbicularis* (Forsk.), c *Pl. pinnatus* L. magnified.

Distribution: Marine fishes of moderate size, living on coral and rocky reefs and in sheltered bays. Occuring in the indo-

Pacific region from the Red Sea and East coast of Africa through the Indic and the Indo-australian Archipelago to Southern Japan, West coast of Australia and in Western Pacific to Samoa and Society Islands.

Note: The references to the species of the genus *Platax* are so much confused that it is difficult to disentangle them, and to give them their proper application, even to those species which are provided with a description by the majority of authors, as they generally used as only characters the proportions of head and body, the form and height of fins and their formule. We know since Günther and Bleeker, that these characters are variable according to age, sex and inherent variability. Herre and Montalban have shown this again by keeping the same individuals for a series of years in confinement as these fish stand it easily to live in an aquarium. Bleeker in his elaborate study about *Platax* added therefore as further specific characters the form of the anterior profile, the character of the squamation and the presence or absence of teeth on the palate, which are indeed of some help in determining the species. We know now that since the studies of Klunzinger and Lütken much reliance may be placed on the character of the dentition and the proportional length of the last dorsal spine. Unfortunately these characters are neglected by Sauvage in his latest revision of *Platax* (1901), while he had the opportunity to study the types of Cuvier and Valenciennes, and the rich material in the Museum of Paris. He contented himself, as his older predecessors, with the description of the form and proportions of head and body, and of the formule of the fins and their form, with the result, that of the 12 species described by Cuvier and Valenciennes he recognizes five, while Bleeker acknowledged only three. The work of Bleeker from 1877 has therefore derived not much profit from the recent study of Sauvage. Both are at variance as to the synonymy. We are also not sure about the correctness of the synonymy as applicated by us.

Key to the indo-australian species of Platax.

I. The 3 cusps of the teeth about equal. Anterior profile evenly convex. A few teeth on vomer which are easily lost. 25—28 scales between top of arched lateral line and dorsal. D.V, 30—33; A. III, 23—24. . . . . 1. *Pl. teira* p. 185.

II. Of the 3 cusps of the teeth the middle one conspicuously longer and stronger than the lateral ones. No vomerine teeth. Anterior profile in adolescent and adult angular, the snout prominent. About 20 scales between top of lateral line and dorsal. D. V, 34—38; A. III, 26—28 . . . . 2. *Pl. orbicularis* p. 189.

III. Of the 3 cusps of the teeth the middle one predominant, much longer and stronger than the lateral ones which are about one third or one quarter of it. About 18—20 scales between top of arched lateral line and dorsal.

1. D. VII, 29—32. A. III, 23. Anterior profile angular, less so in young. Rostro-dorsal profile with a concavity above and below eye . . . . 3. *Pl. batavianus* p. 191.
2. D. V(VI), 36—40; A. III, 28. Anterior profile angular, much less so in young. Rostro-frontal profile with a concavity between snout and eye . . . . 4. *Pl. pinnatus* p. 192.

Doubtful species . . . . 5. *Pl. melanosoma* p. 194.

1. **Platax teira** (Forsk.). (Fig. 49a, 50 and 51).

Chaetodon teira Forskål, Descr. Animal. 1775, p. 60.
Chaetodon teira Bloch, Ausl. Fische III, 1788, p. 65. — Bloch, Schneider Syst. ichth. 1801, p. 221.
Chaetodon teira Lacépède, Hist. nat. Poissons IV, 1803, pp. 460, 496.
Chaetodon teira Shaw, Gen. Zoology IV, 1803, p. 345.
Platax teira Cuvier, Règne Anim. II, 1817, p. 334.
Platax teira Rüppell, Atl. Reise Nördl. Afrika 1828, p. 68 (pp.).
Platax albipunctatus Rüppell, l.c. p. 69 (pullus).
Platax Gaimardi Cuvier & Valenciennes, Hist. nat. Poissons VII, 1831, p. 216.
Platax Raynaldi Cuvier & Valenciennes, l.c. p. 219.
Platax Leschenaldi Cuvier & Valenciennes, l.c. p. 223.
Platax teira Cuvier & Valenciennes, l.c. p. 226.
Platax punctulatus Cuvier & Valenciennes, l.c. p. 228 (pullus).
Platax teira Rüppell, Neue Wirbelth. Fische 1837, pp. 33, 37.
Platax vespertilio japonicus Schlegel in Temminck & Schlegel Fauna *japonica* Pisces, 1850, p. 83 (adolescens).
Platax teira Bleeker, Verh. Batav. Gen. XXIII (1849) 1850, Chaetodont. p. 28.
Platax xanthopus Bleeker, ibidem.
Platax teira Cantor, Journ. Asiatic Soc. Bengal VIII, 1850, p. 1150.
Platax arthriticus Cantor, l.c. p. 1151. (valde adultus).
Platax Boersii Bleeker, Nat. Tijdschr. Ned. Indie III, 1852, p. 758 1).

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1) Lönnberg (Bihang Svenska Akad. XXII, 1896, No. 1 p. 45) writes about this species: „*Chaetodon nigricans* Thunberg (not L.) is probably *Pl. boersii*". Bleeker has later placed this his own species in the synonymy of *Platax teira.*

Platax anagon Montrouzier, Ann. sc. phys. Soc. d'Agriculture Lyon (2) VIII, 1856, pp. 447, 448.
Platax arthriticus Günther, Cat. Brit. Mus. II, 1860, p. 491 (salve synom.).
Platax teira Günther, l.c. p. 492.
Platax teira Kner, Novara-Exp. Fische 1865—67, p. 166.
Platax teira Playfair in Playfair & Günther, Fish. Zanzibar 1866, p. 65.
Platax teira Klunzinger, Abh. Zool. Bot. Ges. Wien XX, 1870, p. 711.
Platax teira Günther, Fische Südsee 1876, p: 141.
Platax teira Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877 Chaetodon. p. 157. — Atl. ichth. IX, 1877, p. 73.
Platax teira Day, Fish. India 4° 1878—88, p. 235.
Platax teira Macleay, Descr. Cat. Austral. Fish. I, 1881, p. 182.
Platax teira Klunzinger, Fische Roth. Meer. 1884, p. 119.
Platax teira Perugia, Ann. Mus. Civ. Genova (2) VII, 1889, p. 274.
?*Platax arthriticus* Sauvage, Poissons Madagascar, 1891, p. 277.
Platax teira Sauvage, l.c. pp. 280, 282.
Platax teira Pfeffer, Jahrb. Hamburger wissenschaft. Anstalten X, 1893, p. 12.
Platax teira Jordan & Fowler, Proc. U. S. Nat. Mus. XXV, 1902, p. 526.
Platax teira Jordan & Seale, Bull. Bur. Fish. XXV (1905) 1906, p. 335.
Platax teira Gilchrist & Thompson, Ann. S. Afric. Mus. VI, 1908, p. 188.
Platax teira Mc Culloch, Rec. Western Austral. Mus. (2) I, 1912, p. 89.
Platax teira M. Weber, Siboga-Exp. Fische, 1913, p. 313.
Platax teira Mc Culloch, Check List N. S. Wales III, Austral. Zoolog. II, pt. III 1922, p. 90.
Platax teira Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, p. 55.
Platax teira Barnard, Ann. S. Afric. Mus. XXI, 1925—27, p. 605.
Platax teira Vinciguerra, Ann. Mus. Civ. Genova (3) X, 1926, p. 571.
Platax teira Fowler, Fish. Oceania Bishop Mus. X, 1928, p. 241.
Platax teira Duncker & Mohr, Mitt. Zool. Mus. Hamburg XLIV, 1919, p. 74.

D.V, 30—33; A. III, 23—24.

Much compressed, oval to rhomboidal, the fronto-ventral profile evenly convex, when snout is closed the snout not forming a prominent angle. Height in adult about equal to length, greater than length in young; head 3—4 in length. Eye 2.8 to 4 in length of head, according to age. Preorbital in all ages lower than diameter of eye. Mouth situated before or slightly below inferior border of eye. The 3 cusps of the teeth of about equal height and size. A few teeth on vomer, which are easily lost with age. About 50 scales in a horizontal line between operculum and base of caudal, about 60—65 in lateral line, 25—30 from top of arched lateral line to dorsal fin. Fifth dorsal spine more than twice to thrice higher than fourth in adult, as long as or longer than length of head. Soft dorsal and anal much produced or falcate in young, becoming shorter with growth, finally with a nearly vertical hind border. Caudal slighty emarginate. Pectorals somewhat rounded, equal to length of head or slighty shorter. Spine of ventrals of about same length, first ray in young produced, about as long as height of body; reaching far on soft anal, later on they are much reduced and finally not longer than head. Colour greyish or light-brownish, with three broad cross-bands, the first through eye, the second through base of pectoral, the third through the posterior part of

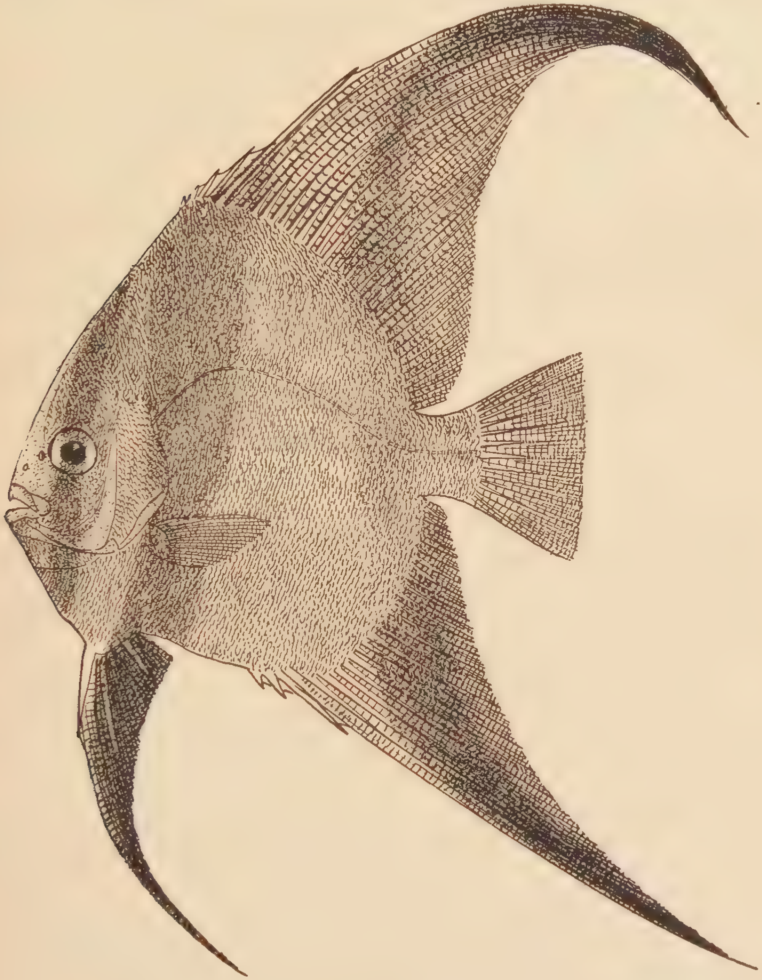

Fig. 50. *Platax teira* (Forsk.) semiadult. × 3/4.

trunk before caudal peduncle, the last named continued on soft dorsal and anal; in young most pronounced, these bands get more diffuse or disappear; dorsal and ventral fins more or less dark-brown especially towards their periphery. Length up to 500 mm.

[Specimens of Bleeker's collection in the Leiden and Amsterdam Museum seen by us].

Nomen indig.: Gampret gĕbĕl, (Malay. Batavia); Gabal Bandjermassin); Bawal-Kundjong (Lampong, Sumatra); Kupu-Kupu (Santubang, Borneo).

Habitat: Penang; Singapore; Bintang; Banka; Sumatra (Telok-betong, Priaman, Siboga, Benkulen); Batu Isl.; Nias; Java (Batavia, Surabaja, Samarang!); Madura; Bawean; Cocos Isl.; Borneo (Santubang, Balikpapan!); Celebes (Makassar!, Menado, Badjoa); Sumbawa; Timor; Solor; Ternate; Halmahera!; Ceram; Ambon!; Banda!; Dobo (Aru-Isl.!); Goram Arch.; Mysore; New-Guinea (Geelvink Bay!). — Red Sea, Eeast coast Africa (Zanzibar, Mosambique, Natal), Madagascar, Mauritius, Seychelles, Muscat South Arabia, British India, Andamans, Malay Peninsula. China, Japan, Riu Kiu Isl., Okinawa, Australia (N. S. Wales, Western Australia), Woodlark, Pelew Isl.

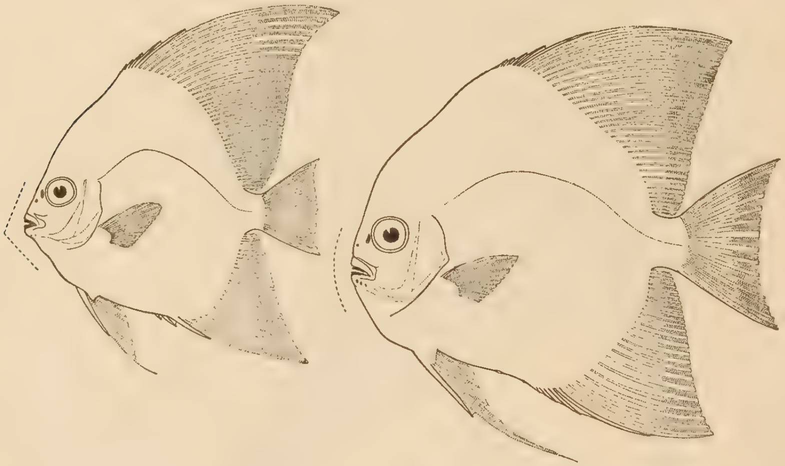

Fig. 51. Left *Platax orbicularis,* right *Platax teira,* both × 1/6. The broken line shows the different anterior profile. After Delsman & Hardenberg.

Note: Herre & Montalban (The Philippine Butterfly

Fishes, Philippine Journ. Sci. XXXIV, 1927, p. 107) unite this species with *Pl. orbicularis* (Forsk.) as they are „unable to distinguish more than one species". They write „It is a very easy matter to select a series of typical *P. orbicularis* and *P. teira* of authors, but we find every possible sort of gradation between. The large scaled forms seem very distinct, but careful examination of many specimens shows that small accesory scales are intercalated, and as they become more numerous the smaller-scaled „species" is formed. We have found every stage showing the transition from large-scaled to small-scaled forms". Furtheron they say: „We do not consider difference in the shape of the profile of any specific value." They content themselves with calling „the slender and compressed teeth setiform and trilobed at their summits, none present on vomer". But unfortunately they have not taken any notice of the studies of Klunzinger and Lütken about the dentition, of the results of which already Jordan & Seale (l.c.) and again Barnard (l.s.c.) made use in their diagnoses of both species.

2. **Platax orbicularis** (Forsk.). (Fig. 49b and 50).

Chaetodon orbicularis Forskål Descript. Animal. 1775, p. 59.
Chaetodon vespertilio Bloch, Ausl. Fische III, 1802, p. 129. — Bloch Schneider, Syst. ichthyol. 1801, p. 228.
Chaetodon vespertilio Lacépède, Hist. nat. Poiss. IV, 1803, pp. 450, 490.
Chaetodon pentacanthus Lacépède, l.c. pp. 454, 476.
Chaetodon vespertilio Shaw, Gen. Zool. IV, 1803, p. 344.
Platax orbicularis Rüppell, Atl. Reise Nördl. Afrika, 1828, p. 67.
Platax vespertilio Rüppell, l.c. p. 143. — Neue Wirbelth. Fische 1837, p. 33.
Chaetodon vespertilio Bennett, Fish. Ceylon 1830, p. 5.
Platax Raynaldi Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 219.
Platax Ehrenbergi Cuvier & Valenciennes, l.c. p. 221.
Platax Blochi Cuvier & Valenciennes, l.c. p. 222.
Platax guttulatus Cuvier & Valenciennes, l.c. p. 227.
Platax pentacanthus Cuvier & Valenciennes, l.c. p. 235.
Platax orbicularis Richardson, Ann. Mag. Nat. Hist. X, 1842, p. 32.
Platax vespertilio Cantor, Journ. Asiat. Soc. Bengal, XVIII, 1850, p. 1148.
Platax Blochii Bleeker, Verh. Batav. Gen. XXIII (1849) 1850 Chaetodon. p. 27.
Platax vespertilio Bleeker, Verh. Bat. Gen. XXV, 1853 Hindostan p. 40. (name only).
Platax orbicularis Bleeker, Nat. Tijdschr. Ned. Indie VII, 1854, p. 81.
Platax vespertilio Günther, Cat. Brit. Mus. II, 1860, p. 489.
Platax vespertilio Playfair & Günther, Fish. Zanzibar 1866, p. 64.
Platax orbicularis Playfair, Proc. Zool. Soc. London 1867, p. 861.
Platax orbicularis Klunzinger, Abh. Zool. Bot. Ges. Wien XX, 1870, p. 793.
Platax orbicularis Günther, Fische Südsee 1876, p. 140.

Platax vespertilo Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877 Chaetodont. p. 160. — Atl. ichthyol. IX, 1877, p. 74.
Platax vespertilio Day, Fish. India 4°, 1878—88, p. 236.
Platax vespertilio Lütken, Spolia Atlantica, Vidensk. Selsk. Skr. (5) XII, 1880, p. 562[1]).
Platax vespertilio Macleay, Descr. Cat. Austral. Fish. I, 1881, p. 181.
Platax orbicularis Macleay, l.c. p. 182.
Platax vespertilio Klunzinger, Fische Roth. Meer. 1884, p. 118.
Platax vespertilio Sauvage, Poissons Madagascar, 1891, p. 272.
Platax vespertilio Fowler, Proc. Acad. Nat. Sci. Philadelphia LV, 1903, p. 161.
Platax orbicularis Picaglia, Atti Soc. Modena (3) XIII, 1894, p. 29.
Platax orbicularis Fowler, Journ. Acad. Nat. Sci. Philadelphia (2) XII, 1904, p. 544.
Platax vespertilio Fowler, ibidem.
Platax vespertilio Steindachner, Sitzb. Akad. Wien CXV, 1906, p. 1391.
Platax orbicularis Jordan & Seale, Bull. Bur. Fish. XXV (1905), 1906, p. 335.
Platax orbicularis Evermann & Seale, Bull. Bur. Fish. XXVI, (1906), 1907, p. 97.
Platax orbicularis Jordan & Seale, Bull. Bur. Fish. XXVI (1906) 1907, p. 32.
Platax orbicularis M. Weber, Siboga-Expeditie 1913, p. 313.
Platax vespertilio Hora, Mem. Asiat. Soc. Bengal VI, 1924, p. 489.
Platax vespertilio Barnard, Ann. S. Afric. Mus. XXI, 1925—27, p. 606.
Platax vespertilio Ahl, Blätt. Aquar. & Terrarienkunde 38, 1927 Hft. 1.
Platax orbicularis Herre & Montalban, Philippine Journ. Sci. XXXIV, 1927 p. 105 (pp).
Platax orbicularis Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 241. (salve synon.).
Platax orbicularis Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 21.
Platax orbicularis Herre, Notes Fish. Zool. Mus. Stanford Univ. I, 1931, p. 58.

D.V, 34—38; A. III, 26—28.

Strongly compressed, oval to rhomboidal, the anterior profile in adult, when mouth is closed angular, the convex rostro-frontal and the convex ventrol-rostral profile meeting at the prominent snout in an obtuse angle. Height in adult more than length; head 3,4 to 4. Eye 2,25—3,50. in head. Preorbital almost not or much lower than diameter of eye. Mouth situated below, in old specimens much below inferior border of eye. The middle one of the three cusps of the teeth is longer and stronger than the lateral

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1) Lütken, who saw the type of *Chaetodon orbicularis* of Forskål of 230 mm length and therefore adult, in the Copenhagen Museum, is convinced of its identity with *Platax vespertilio* Bloch.

ones. No vomerine teeth. About 50 scales in a horizontal line between operculum and base of caudal, about 55 in lateral line, about 20 above top of arched lateral line to dorsal fin. Fifth dorsal spine about twice as high as fourth, shorter than head. Soft dorsal and anal less produced and nearly not falcate in young than in *Pl. teira,* becoming obtuse with growth, with a rounded hindborder. Pectorals rounded, not or nearly not shorter than head. Spine of ventrals shorter than head, their first ray less produced than in *teira,* reaching on anal. Caudal truncate, the lobes somewhat produced. Colour as in *teira,* but the ocular and pectoral cross-bands may be broader, the third more diffuse; there may be a tranverse band at base of caudal. In very young the body shows small widely spread spots. Length up to 320 mm.

Nomen indigen: Gampret gěběl (Malay. Batavia).

Habitat: Penang; Singapore!; Bintang; Batu Isl; Banka; Pulu Weh!; Sumatra (Benkulen, Trussan, Priaman, Tikus, Siboga, Atjeh!, Sabang!,); Nias!; Java (Batavia, Surabaja, Bantam, Prigi); Cocos Isl.; Madura; Bawean; Bali; Solor; Timor!; Borneo (Sandakan); Celebes (Makassar!, Badjoa, Menado!, Tanawanko, Tombariri); Sangir Isl.; Ternate; Halmahera!; Batjan; Buru; Obi major; Ceram!; Ambon; Kei-Isl.!; Muna (Raha!); Goram Arch.; Waigeu; Mysore; New Guinea. — Red Sea, East coast of Africa (Zanzibar, Mozambique), Madagascar, Bourbon, Mauritius, Seychelles, Muscat, British India, Ceylon, Andamans, Peninsular Siam, Malay Peninsula, China, Japan, Bonin Isl., Formosa, Philippines, Australia (Queensland), Solomon Isl., Admirality Isl., New Ireland, Society Isl., Fiji Isl., Samoa, Paumotu.

3. **Platax batavianus** C. V.

Platax batavianus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 225.

Platax batavianus Bleeker, Nat. & Geneesk. Arch. Ned. Indie (3) II, 1845, p. 321 (name only). — Verh. Batav. Gen. XXIII (1849) 1850 Chaetodont. p. 28.

Platax arthriticus Günther, Cat. Brit. Mus. II, 1860, p. 491 (p.p.) [nec C.V. nec Cantor].

Platax batavianus Kner, Novara-Exp. Fische 1865—67, p. 165.

Platax batavianus Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877 Chaetodont. p. 165. — Atl .ichth. IX, 1877, p. 76.

Platax batavianus Lütken, Spolia Atlant. Vidensk. Selsk. Skr. (5) XII, 1880, p. 563.

Platax bataviensis (sic) Sauvage, Poissons Madagascar, 1891, p. 278.

D. VII, 29—32 [1]; A. III, 22—23.

Body in young rhomboidal, later more rounded; the fronto-rostro-ventral profile angular but much less so and more rounded, also in young, than in adult the rostro-ventral. In adult the snout is much more prominent, the rostro-frontal profile with a concavity above snout thence convex with a second concavity above eye, furtheron strongly convex till dorsal, the rostro-ventral profile oblique. Height in adult about equal to length, in young somewhat higher than long, head about 4 in length. Eye 2.5 to 3 in length. Preorbital in all ages lower than diameter of eye. Prominent snout longer than that diameter; gape of mouth far below lower border of eye. Of the three cusps of the teeth the middle one is prominently the most conspicuous in length and size, the two lateral cusps are about one third or one quarter of it; conspicuous teeth in two patches on palatines and an approximate band of vomerine teeth. About 50 scales in a horizontal series between operculum and base of caudal, 20 between top of arched lateral line and dorsal fin. Soft dorsal and anal in young much produced, falcate with a concave hind border, their anterior rays are much reduced with growth till finally in adult the hind margin of both fins is rounded. Last dorsal spine in young longer, in adult shorter, than head and about twice longer than preceeding spine. Pectorals acutely rounded, shorter than head; ventrals with a spine of moderate strength, shorter than head, their first ray in young twice longer, in adult about equal to head. Caudal truncate or slightly emarginate. Colour greyish or brownish, the three dark crossbands: the first through eye, the second through base of pectoral, the third from dorsal to anal, before caudal peduncle, become diffuse in adult and may even disappear, especially the dorso-anal one. Length up to 300 mm.

Nomen indig. Gampret (Malay, Batavia); Babal (Sundan.); Tudjong-prio (Bintang).

Habitat: Singapore; Penang; Banka; Bintang; Biliton; Sumatra (Telokbetong, Benkulen, Siboga); Nias; Java (Batavia, Anjer); Thousand Isl; Celebes (Makassar, Bonthain, Menado); Solor; Ternate; Ambon; Waigeu. — Madagascar.

4. **Platax pinnatus** (L.). (Fig. 49c).

? *Chaetodon pinnatus* Linnaeus, Mus. Ad. Frid. 1764. p. 64, tab. 33 fig. 6.
? *Chaetodon pinnatus* Linnaeus, Syst. nat. ed. Xa, 1758, p. 272. — Linné.

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[1] By exception the dorsal spines are reduced to VI.

Gmelin op. cit. ed. XIIIa 1788, p. 1241.
Chaetodon pinnatus Bloch, Schneider, Syst. ichth. 1801, p. 230.
Platax gampret Bleeker, Verh. Batav. Gen. XXIII (1849) 1850 Chaetodont. p. 29. — Nat Tijdschr. Ned. Indië I, 1850, p. 108.
Chaetodon setosus Gray, Cat. fish. descr. by Gronovius, 1854, p. 76 (Fide Bleeker).
Platax expansus Montrouzier, Ann. sc. phys. Soc. d'Agric. Lyon (2) VIII, 1856, p. 447.
Platax pinnatus Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877 Chaetodont. p. 163. — Atl. ichth. IX, 1877, p. 75.
Platax pinnatus Lütken, Spolia Atlant. Vidensk. Selsk. Skr. (5) VII, 1880, p. 563.
Platax pinnatus Macleay, Proc. Linn. Soc. N. S. W. VII, 1882, p. 359. (name only).
Platax pinnatus Jordan & Seale, Bull. Bur. Fish. XXV, 1906, p. 336 (name only).
Platax pinnatus M. Weber, Siboga-Exp. Fische, 1913, p. 313 ¹).
Platax pinnatus Fowler & Bean, Bull. U.S. Nat. Mus. VIII, 1929, p. 18. (salve synon.).

D. V (VI), 36—40; A. III, 26—29.

Body in young rhomboidal in adult more rounded; in young the fronto-rostro-ventral profile slightly angulate, the closed mouth somewhat prominent; in adolescent and more so in adult the fronto-rostral profile concave between snout and eye, furtheron convex till dorsal, the rostro-ventral profile getting more straight in adult and the snout more prominent. Height shorter than length, head about 4. Eye about 2.5 in length of head. Preorbital shorter than eye. Mouth situated below lower border of eye, in adult more so. Of the three cusps of the teeth, the middle one is predominant in length and strength, the two lateral cusps are about one third or one quarter of it. Teeth on vomer present. About 50 scales in a horizontal line between operculum and base of caudal, about 18 above top of arched lateral line to dorsal fin. Fifth dorsal spine in young longer, in adult shorter than head; soft dorsal and anal in young and adolescent elongate and falcate, in adult much shorter and rounded posteriorly. Pectorals acutely rounded, equal to length of head or somewhat shorter. Spine of ventrals in all ages shorter than head, their first prolonged ray in young more, in adult less than twice longer than head. Caudal very slightly emarginate. Colour in young grayish or yellowish-brown with an ocular, thoracal and dorso-anal conspicuous brown cross-band and a

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1) By misprint spelt primatus (L).

narrow rostro-frontal median red band. This band disappears with growth, the crossbands getting diffuse and finally disappear, especially the dorsal-anal one. Length up to 360 mm.

Nomen indig.: Gampret (Malay, Batavia); Taferbor (Menado); Daun-baru, Papeh (Batjan).

Habitat: Singapore; Java (Batavia, Surabaja); Madura; Celebes (Menado); Saleyer!; Batjan; New Guinea. In sea.

Note: We have a young specimen of 105 mm length which agrees in its finformula, straightness of rostro-dorsal profile and dentition with *pinnatus*. It has also the rather broad median rostro-frontal white (in live red) band, narrowly continued on the frontborder of the spinous dorsal as described and figured by Bleeker. In a mitigated manner it has otherwise, the melanistic characters of *Pl. melanosoma* Blkr.: the strongly prolonged dorsal, anal and ventrals are black, also the caudal with exception of a light margin; of the pectorals only the basis is black; head black, anterior part of trunk between dorsal and anal blackish brown, giving the impression that the black is rubbed off. It is a juvenile stage of pinnatus which is nearly indentical with *melanosoma* Blkr. (see next species).

Doubtful species.

5. **Platax melanosoma** Blkr.

Platax melanosoma Bleeker, Vischfauna Amboina p. 10 in Acta Soc. Sc. Indo-Neerl. VIII, 1860. — Verh. Akad. Amsterdam XVII. (1876) 1877 Chaetodont. p. 162. — Atl. ichth. IX, 1877, p. 75.

Bleeker has described this species after a single specimen of 52 mm length from Ambon. He doubts its validity, it seems to him very near to *Pl. pinnatus:* „mais la couleur uniforme et noirâtre du corps et l'absence de dents voméro-palatines ne permettent pas d'y voir le jeune âge du Platax pinnatus".

We suppose that it is a melanistic variety of *pinnatus* (L) as exposed in our note on page 194.

21. Family TOXOTIDAE.

Oblong or more or less compressed; covered with ctenoid moderate or small scales, extending on head and soft dorsal, anal and caudal fins; lateral line complete, straight or usually with a more or less pronounced dorsal inflection in its anterior half.

Head conical produced, flattened above with a feeble occipital crest. Eyes large, lateral, for their major part in anterior half of head. Two approximate nostrils on each side. Snout produced, lower jaw the longest; mouth terminal, oblique, protactile, its gape wide. Maxillary slender throughout, scaly, without a supplemental bone. Preorbital narrow with the anterior margin serrated. Lower border of preoperculum serrated. Gillmembranes free from isthmus; seven branchiostegals; pseudobranchiae present; four gills with a slit behind the last; lower pharyngeal bones separate. Villiform teeth in jaws, on vomer, palatines and pterygoids. No subocular shelf. Dorsal in posterior half of body, opposite anal; with IV, usually V strong spines and 11—14 rays; anal with III spines and 15—17 rays. Caudal with 15 principal rays, truncate or slightly emarginate. Pectorals situated rather high up, more or less acute, longer than ventrals, which are originating somewhat behind their base, have a strong spine and five soft rays and a large scaly axillary process. Vertebrae 24 (10 + 14).

Distribution: That of the single genus known[1]).

1. **Toxotes** Cuvier.

(G. Cuvier, Règne animal 1817, p. 338).

For characters of the single genus known see those of the family.

Distribution: Fishes of moderate size, living in littoral water of low salinity, in brackish water of estuaries and in rivers. They are distributed in Southern and Southeastern Asia from British India, the Andamans, the Indo-australian Archipelago to the Philippines in the North, to Australia in the South and to the Solomons and New Hebrides in the East.

Note: *Toxotes* is since long renowned for its faculty to catch insects seen at a distance outside the water, by rising to the

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1) Bleeker (Arch. Néerl. Sc. nat. XI, 1876, p. 311) has created a second genus: *Amblytoxotes,* after the description of Hutton in Ann. Mag. Nat. Hist. London (4) XVI, 1875, p. 313, of *Toxotes squamosus* Hutton from New Zealand from a stuffed specimen. But Hector (Ann. Mag. Nat. Hist. (4) XIX, p. 339) proved that Hutton's species belonged to the genus *Brama* Cuv. (Lepodus Raf.), a correction adopted by Bleeker (Atl. ichth. IX, 1877, p. 2) and by Hutton (Index Faunae Novae Zealandiae 1904). The revival of *Toxotes (Amblytoxotes) squamosus* Hutton in the monagraph of Fowler & Bean (Bull. U. S. Nat. Mus. X, 1929, p. 29) must therefore be cancelled.

surface and shooting drops of water at them. Bleeker (Verslag. Akad. Amsterdam (2) IX, 1876, p. 164) has shown, that this was originally a wrong assumption, for the first publication about a fish able to shoot at insects, came from Hommel at Batavia

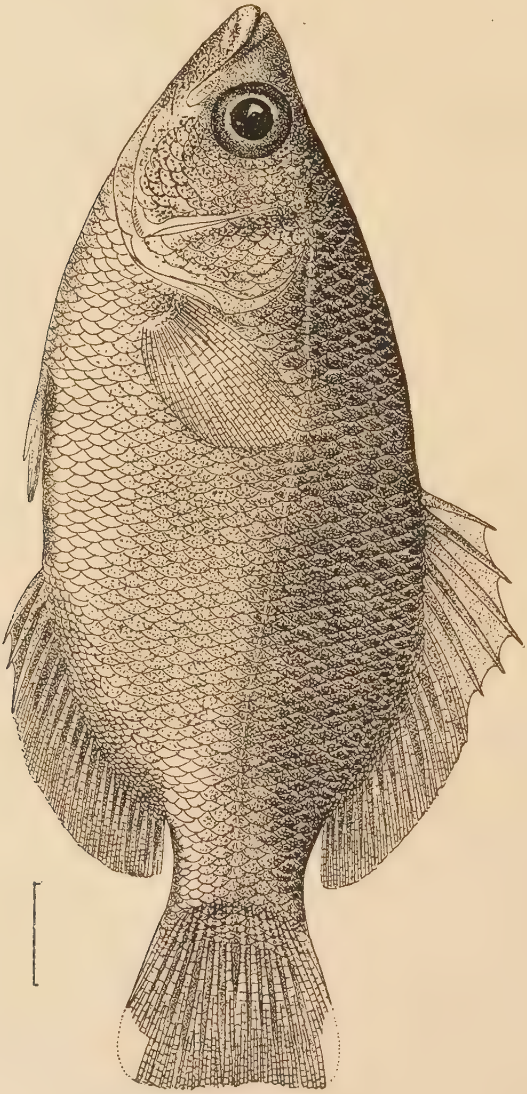

Fig. 52. *Toxotes lorentzi* M. Web. × 1/3.
After M. Weber.

and appeared, by the intermediary of Schlosser, in the Philosoph. Transact. LIV, 1764, p. 89, but it referred to *Chaetodon rostratus* L. (*Chelmon rostratus* (L)), as is confirmed by the ample quotation of Shaw (Gen. Zoology IV, 1803, p. 337). Two years later appeared in the Philosoph. Transact. of 1766, again by the intermediary of Schlosser, a second more explicit notice by Hommel about the same subject. He sent to Schlosser an other, „a second species", a description and a figure of which by Pallas, was added to the publication of Hommel's notice. Pallas named it *Sciaena jaculatrix,* the Jaculator fish because he wrongly attributed to it the shooting-faculty of *Chelmon rostratus,* repeated in his Spicilegia Zool. VIII, 1770, p. 41. Wrongly, because at that time there were no facts known to corroborate his assumption. Even Bleeker wrote in 1876 about the renowned faculty of *Toxotes,* „Je crois aussi que la célébrité n'est pas méritée et ne repose que sur une erreur". Day and others were of the same opinion, while Cantor (1850) rightly remarked, that the Malayan name for *Toxotes* is ikan sumpit or sumpitan; „ikan signifying fish; sumpit or sumpitan a blow-pipe: a denomination recording the habits of a shooter". The above cited historical facts are not quite clear from the lengthy article of Gill (The Archer-Fish and its Feats, Smithson. Miscellan. Collect. LII (V) 1909, p. 277), in which he relates the results of a paper of Zolotnitsky (Le Poisson Archer (Toxotes jaculator) en Aquarium, Arch. Zool. Expér. et Gén. (3) X, 1902) who fully corroborated the discredited account about the archer-fish. Other authors after him have shown, that it merits really that name. Mr. van Nouhuys, a good observer, who had occasion to observe *Toxotes chatareus* (Ham. Buch.) in the rivers of New Guinea, informed me that also this species is able to shoot drops of water as is also stated by Chevey (Poiss. Campagnes „de Lanessan" I, 1932, p. 71). There remains only a discrepancy of meaning about the manner of shooting. The supposition of Gill and others that it is effected without shoving the mouth above the surface of the water, is erroneous as is again demonstrated by the latest author 1) who relates that the fish in the short moment of shooting puts the top of the closed mouth outside the water. Even by closed mouth remains a minute

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1) Verweij, Iets over de voedingwijze van Toxotes jaculator in Tropische Natuur, Batavia, 1928, No. 10, p. 162. See also van Mullem, l.c. and Meissen in Brehms Tierleben.

opening between the mandibulary symphysis and the upper jaw; through it the water is shot out by closing the gillplates, compressing the opercular and branchiostegal apparatus and lifting upwards of the floor of the cavity of the mouth.

Key to the Indo-Australian species of Toxotes.

I. L.l. 46; running in a straight course, without any inflection. Origin of dorsal much before that of anal, conspicuosly, nearer to end of snout than to end of caudal. D. V, 13—14. Head and body without any markings . . . . 1. *T. lorentzi* p. 198.

II. L.l. with an upwards directed inflection in its anterior part; squamae laterales 23—42. Origin of dorsal more or less opposite to that of anal, nearer to end of caudal than to end of snout, or in the middle of them. Head and body with dark blotches or vertical stripes.

1. Four dorsal spines.

   Squamae laterales 28—30. l. tr. $\frac{4}{9-10}$ . . . . . 2. *T. jaculator* p. 199.

2. Five dorsal spines.

   a. Squamae laterales 40—42; l.tr. $\frac{6}{13-14}$ . . . 3. *T. microlepis* p. 202.

   b. Squamae laterales 33—34; l. tr. $\frac{5}{11-13}$ . . . 4. *T. chatareus* p. 203.

   c. Squamae laterales 23—24; l. tr. $\frac{3}{11-13}$ . . . 5. *T. oligolepis* p. 205.

1. **Toxotes lorentzi** M. Web. (Fig. 52).

Toxotes Lorentzi M. Weber, Notes Leyden Mus. XXXII, 1911, p. 232. — Nova Guinea IX, Zool. 4, 1913, p. 572.
Toxotes lorentzi Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 242.
Toxotes lorentzi Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929 p. 33.

D. V, 13—14; A. III, 15—16; P. I, 14; V. I, 5. L.l. ca 46; L. t. $\frac{7}{13}$.

Oblong, compressed. Height 2.3, 2.7—2.8 in length with caudal. Head 3.4—3.5, 2.9 in length with caudal, pointed, the rostro-dorsal profile straight from snout to eye, above eye slightly concave, thence somewhat convex and gradually rising to dorsal. Ventral profile evenly convex. Eye 3.7—4 in head, situated totally in anterior half of head; equal to pointed snout and about $^1/_3$ shorter than flattened interorbital space. Mouth oblique, mandibula promienet, maxillary surpasses vertical through frontborder of pupil. Scales small, 30—33 scales between dorsal and nostrils; lateral line straight from top of branchial opening to middle of base of caudal. Origin of dorsal nearer to end of snout than to end of caudal, situated 8 to 9 scales before anal spine; first spine somewhat longer than diameter of eye and about $^1/_4$ shorter than second spine, third spine the longest and about as long as postorbital part of head. Soft dorsal and anal convex, their height equal to $1^1/_2$ diameter of eye. Caudal nearly truncate, its corners probably rounded (they were damaged as also top of pectorals). Colour in alcohol dusky brown on back; flanks gradually lighter till yellowish ventral surface; median fins dusky, the paired fins hyaline and dusky. Colour without any markings. Length 115 mm.

Habitat: Freshwater pool near Merauke, South-New-Guinea!.

Note: This species is nearest to *T. microlepis* Gthr. and *T. blythi* Blgr. but surpasses them by the smallness of the scales. It is distinguished by the want of any dark stripes or patches; by the straight course of the lateral line; by the more anterior position of the dorsal, the less elevated body; in all these points the species seems to be the most primitive form of the known *Toxotidae*.

2. **Toxotes jaculator** (Pall.) (Fig. 53, D.).

Sciaena jaculatrix Pallas, Philos. Transact. London, LVI, 1766, p. 186. — Spicil. Zool. VIII, 1770, p. 41.
Scarus Schlosseri Linné-Gmelin, Syst. Nat. ed. XIIIa, 1788, p. 1228.
Labrus jaculatrix Lacépède, Hist. nat. Poiss. III, 1803, pp. 425, 464.
Scarus Schlosseri Lacépède, Op. cit. IV, 1803, pp. 5, 17.
Chaetodon rostratus Shaw, Gen. Zool. Pisces IV, 1803, p. 337.
Scarus Schlosseri Shaw, l.c. p. 398.
Labrus jaculator Shaw, l.c. p. 485.
Toxotes jaculator Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 314.
Toxotes jaculator Bleeker, Nat. en Geneesk. Arch. Ned. Indië (4) I, 1844, p. 553 (name). — Journ. Ind. Arch. II, 1848, p. 633 (name). — Chaetodontoïden p. 31 in Verh. Batav. Gen. XXIII (1849) 1850.
Toxotes jaculator var. malaccensis of C. V. Cantor, Journ. Asiat. Soc. Bengal XVIII, 1850, p. 1158.
Toxotes jaculator Montrouzier, Ann. Soc. d'Agriculture Lyon, (2) VIII, 1856, p. 449.
Toxotes jaculator Günther, Cat. Brit. Mus. II, 1860, pp. 67, 510.
Toxotes jaculator Peters, Monatsber. Akad. Berlin (1868) 1869, p. 257.
Toxotes jaculator Day, Proc. Zool. Soc. London 1870, p. 687.

Toxotes jaculator de Castelnau, Proc. Zool. Soc. Victoria 1873, p. 84.
Toxotes jaculator Bleeker, Versl. Akad. Amsterdam (2) IX, 1876, p. 164. —Atl. icht. IX, 1877, p. 4.
Toxotes jaculator Macleay, Descr. Cat. Austr. Fish. I, 1881, p. 99. — Proc. Linn. Soc. N. S. Wales VII, 1882, p. 245.
Toxotes jaculator Sauvage, Bull. Soc. Philom. (7) VII, 1883, p. 150.
Toxotes jaculator Day, Fish. India 4°, 1878—1888, p. 117. — Fauna British India, Fishes, II, 1889, p. 23.
Toxotes jaculator Volz, Zool. Jahrb. Abth. System. XIX, 1903, p. 356. (name).
Toxotes jaculator Seal, Occas. Papers Bishop Mus. IV, 1906, p. 63 (name).
Toxotes jaculatrix Jordan & Seale, Bull. Bur. Fish. 1908, p. 268.
Toxotes jaculatrix Seale, Philippine Journ. Sci. V, 1910, p. 282.
Toxotes jaculatrix de Beaufort, Bijdr. Dierk. 1913, p. 111.
Toxotes jaculator Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 242.
Toxotes jaculator Duncker & Mohr, Mitt. Zool. Mus. Hamburg. XLIV, 1929, p. 74.
Toxotes jaculator Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 30.
Toxotes jaculator Herre, Fishes of Herre Philippine Exp. 1931, p. 59.

D. IV, 12—13; A. III, 15—16; L. l. 28—30, L. tr. $\frac{4}{9-10}$.

Oblong, anteriorly pointed, posteriorly somewhat elevated, greatest height between origin of dorsal and anal, 2.4 in length, 2.9 in length with caudal; rostro-dorsal profile nearly straight, very broad and flattened. Head somewhat shorter than height. Eye about 3.7 in head, as long as pointed snout, much shorter than flat interorbital space above middle of eye. About 23 scales between first dorsal spine and posterior nostril; lateral line curved upwards between the 4th and 9th lateral scale, the curvature terminating three scales before origin of dorsal. Base of dorsal shorter than that of anal; first spine much shorter than the succeeding, which are subequal, usually the third the longest, shorter than half length of head; rays lower, decreasing in size posteriorly with a straight margin. Third anal spine the longest, thrice the length of the first spine, as high as highest part of rounded rayed part. Pectorals as long as head without snout, ventrals equal to postorbital part of head. Caudal slighty emarginate. Colour yellowish or silvery, back brown or olivaceous, from where usually descend five more or less triangular dark blotches, the rounded point of which reaching to middle line of flanks; the first on the nape, the second behind operculum, the third with its broad base before and below origin of dorsal, the fourth below soft dorsal, the small fifth on short caudal peduncle; angel of soft dorsal with a blackish spot, outer half of anal blackish. Length 235 mm.

Nom. indig.: Sumpit (Malay.) Blibiran (Javan.).

Habitat: Sea of Pinang; Singapore; Bintang; Batu Isl.; Banka; Biliton; Sumatra (Telokbetong, Belawan Deli!, Tandjong, Benkulen, Padang, Siboga, Palembang, Lahat, Djambi, Djápura); Simalur!; Nias; Java (Batavia!, Tjilatjap, Prigi); Sumbawa; Flores!; Timor!; Borneo (Sinkawang, Sungi-Duri, Pontianak, Sintang, Bandjermasin, Stagen!, Bunut!, Upper-Riko!, Sandakan-Bay); Celebes (Makassar!, Maros!, Menado, Tanawanko); Sangir; Ternate; Batjan; Buru; Ambon!; Haruku!; Ceram; Waigeu!; Muna (Kalda!, Raha!); Misool; Mysore; New Guinea! (Skroë!). — Britsh India, Andamans, Siam, Philippines, Australia, (Port Darwin), Woodlark, Solomons, New-Pommern, Admirality Isl., New Hebrides. Seems to be restricted to the more or less brackish water of estuaries and mangrove swamps.

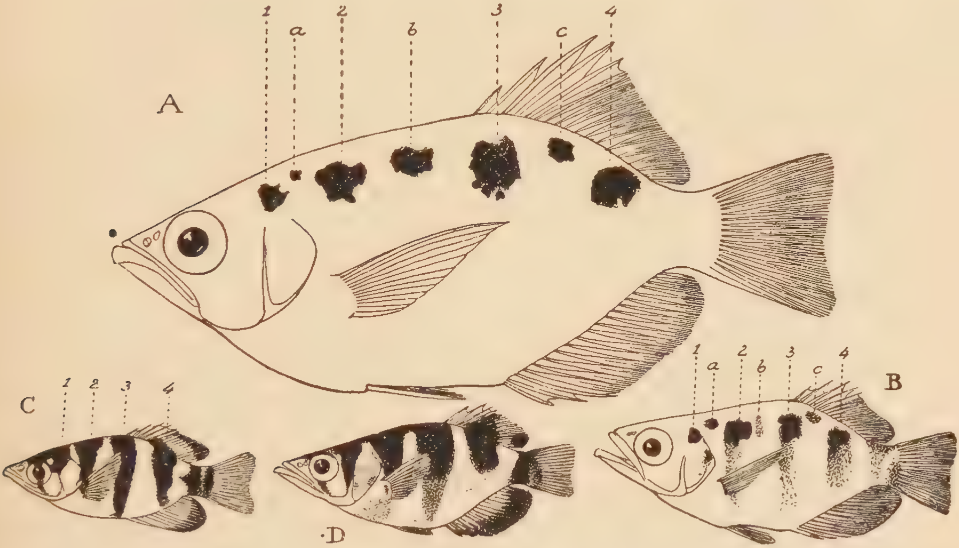

Fig. 53. A. (adult), B, C (juvenes) of *Toxotes chatareus* from New Guinea; D. *Toxotes jaculator* (juv.) from Borneo, all about n. s. C and D with similar marking. In B disappear the four transverse bands 1, 2, 3, 4 of *jaculator* and remain in A only four dorsal patches, which together with a, b, c form the permanent marking of *chatareus*.

3. **Toxotes microlepis** Gthr. 1)

Toxotes microlepis Günther, Cat. Brit. Mus. II, 1860, p. 68.
Toxotes microlepis Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 173. — Versl. Akad. Amsterdam (2) IX, 1875, p. 158. — Atl. ichth. IX, 1877 p. 2.
?*Toxotes microlepis* v. Martens, Exp. Ost-Asien, 1876, p. 310.
?*Toxotes microlepis* Karoli, Termeszetrajzi füzetek V, 1882, p. 10.
?*Toxotes microlepis* Sauvage, Bull. Soc. Philom. (7) VII, 1883, p. 150.
Toxotes microlepis Boulenger, Ann. Mag. Nat. Hist. (6) IX, 1892, p. 143.
Toxotes microlepis Vaillant, Bull. Soc. Zool. France, XVIII, 1893, p. 59. — Nouv. Arch. Mus. Hist. Nat. (4) V, 1893, p. 110. — Notes Leyden Mus. XXIV, 1902, p. 32, (name only).
?*Toxotes microlepis* Fowler, Proc. Acad. Nat. Sc. Philadelphia (2) LVII, 1905, p. 507.
Toxotes microlepis Hora, Journ. Nat. Hist. Soc. Siam VI, 1923, p. 177.
Toxotes microlepis Chevey, Invent. faune ichth. Indochine. 1932, p. 24.
Toxotes microlepis Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 33. (salve synon.).

D. V, 13; A. III, 17; Sq. lat. 40—42; L. tr. $\frac{6}{13-14}$.

Oblong oval, pointed anteriorly, rostro-dorsal profile ascending in a straight line till dorsal; ventral profile more convex; height about twice in length, 2.3 in length with caudal; head 2.9, 3,4 in length with caudal. Eye 3,6—4 in head, less than interorbital space and about equal to pointed snout. About 25 scales between dorsal and posterior nostril. Lateral line with a strong curvature in its anterior part, directed upwards and terminating below origin of dorsal. Base of dorsal and anal of equal length, totally opposite. First dorsal spine the lowest, nearly half length of second, the three following higher, about subequal and somewhat longer than soft dorsal. Third anal spine longer than the two preceding, about twice diameter of eye, higher than soft anal. Caudal slightly emarginate. Pectorals nearly as long as head without snout. Ventrals about one third shorter. Colour yellowish with greenish or olivaceous back; above middle line a series of blackish blotches which are subject to much variation and have sometimes more the from of transverse bands: usually four or five, the first on operculum, the third below spinous, the fourth below soft dorsal; a fifth may be intercalated; one or two narrow bands round base of caudal, a black spot at angel of soft dorsal; anal and ventrals more

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1) To some of the quotations we have added a query as it was not possible to decide, if *T. microlepis* Gthr. or *T. blythi* Blgr. (= *T. microlepis* Blyth) was meant by the author.

or les blackish. Length 150 mm. [Specimen of Bleeker's collection in the Amsterdam Museum seen by us.].

Habitat: Sumatra (Palembang); Borneo (Bandjermasin, Tepoe, Sintang!, Smitau!, Sanggan!). — Siam in rivers.

The species is often confounded with *Toxotes blythi* Boulenger from Burma, (see note).

Note. A short time after Günther had made known from Siam the above named species, Blyth (Journ. Asiatic Soc. Bengal XXIX, (1860) 1861, p. 142) described independently a *Toxotes microlepis* Blyth from Tenasserim. Bleeker, Day, Vinciguerra assumed the two species to be identical; Day quoting Blyth, the others Günther as author. Boulenger (Ann. Mag. Nat. Hist. (6) IX, 1872, p. 143) was the first to show that they are easily distinguishable as regards structure and colouration. He changed the name of the Burmese species of Blyth to *Toxotes blythi*. One of its conspicuous distinctive characters are the irregular black longitudinal blotches or stripes running along the body and a small black spot below the axilla, as shown in Day's figure (Fish. India 4° 1878—1888 pl. XXX fig. 1), while in *T. microlepis* Gthr., there are four black blotches or vertical bars on the upper part of the side, as shown in Bleeker's figure (Atl. ichth. IX, 1877). The species known from the Indo-australian Archipelago belongs to *T. microlepis* Gthr., that described by Day from the Irawaddi to *T. blythi* Blgr.; in the Fauna of British India II, 1889, p. 22, he has mixed the habitat of *T. microlepis* Gthr. — Neither of them seems to be represented in India proper.

In the recent monograph of Fowler & Bean the papers of Day are wrongly cited in the synonymy of the present species. The decriptions of Day refer to *T. blythi* Blgr. from Tenasserim, a species overlooked by Fowler & Bean.

4. **Toxotes chatereus** (Ham. Buch.) (Fig. 53. A, B, C.).

Coius chatareus Hamilton, Buchanan. Fish. Ganges. 1822, pp. 191, 370.
Toxotes jaculator Cuvier & Valenciennes, Hist. Nat. Poiss. VII, 1831, p. 314 (p.p.).
Toxotes jaculator Günther, Cat. Brit. Mus. II, 1860, pp. 67, 519 (p.p.).
Toxotes chatareus Bleeker, Versl. Akad. Amsterdam (2) IX, 1875, p. 160. — Atl. ichth. IX, 1877, p. 2.
Toxotes chatareus Day, Fish. India 4°, 1878—88, p. 117.
Toxotes chatareus Klunzinger, Sitzb. Akad. Wien, 1880, p. 364.
Toxotes chatareus Steindachner, Densch. Akad. Wien XII, 1879, p. 3.

Toxotes chatareus Vinciguerra, Ann. Mus. Civ. Genova, (2) II, 1885, p. 87.
Toxotes chatareus Day, Fauna Brit. India, Fishes. II, 1889, p. 23.
Toxotes chatareus Dunker, Mitt. Naturh. Mus. Hamburg, 1904, p. 152.
Toxotes chatareus M. Weber, Nova Guinea V Zool. 1908, p. 244. — o.c. IX, 1913, p. 571.
Toxotes chatareus C. Tate Regan, Trans. Zool. Soc. London, XX, 1914, p. 276.
Toxotes chaleareus (sic) Rendahl, Nyt Magas. Naturv. LX, 1922, p. 184.
Toxotes chatareus Hora, Mem. Asiatic Soc. Bengal VI, 1924, p. 491.
Toxotes chatareus Vinciguerra, Ann. Mus. Civ. Genova (3) X, 1926, p. 587.
Toxotes chatareus Fowler, Fish. Oceania., Bishop Mus. X, 1829, p. 242.
Toxotes chatareus Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 33.
Toxotes chatareus Herre, Fishes Herre Philippine Exp. 1931, p. 59.
Toxotes chatareus Chevey, Travaux Inst. Océanogr. Indochine, Mém. IV, 1932, p. 70.

D. V, 13; A. III, 17; Sq. lat. 33—34; L. tr. $\frac{5}{11-13}$.

Oblong, anteriorly pointed, posteriorly somewhat elevated, its greatest height between origin of dorsal and anal, 2.3 to 2.4 in length, nearly 3 in length with caudal. Head 2,7 in length, 3.3 in length with caudal. Rostro-dorsal profile nearly straight, at most with a slight concavity above the eyes, very broad and flattened. Eye less than 4 in head, equal to or slightly longer than pointed snout, shorter than interorbital space, 26—28 scales between posterior nostrils and origin of dorsal. Lateral line with an inflection directed upwards, terminating below origin of dorsal spine. Base of dorsal and anal of equal length. Origin of dorsal sligthly before that of anal, situated about in the middle of end of snout and of end of caudal. Third and fourth dorsal spine subequal, the longest nearly equal to head without snout; fifth spine shorter, but slightly higher than soft dorsal, the margin of which is truncate. Anal rounded, its third spine the longest. Caudal slightly emarginate. Pectorals longer than head without snout, ventrals about twice shorter. Colour yellowish or silvery, back greenish-brown, in adult with 6—7 oblong or roundish black blotches of unequal size in an irregular longitudinal series from eye to end of dorsal above lateral line. Usually four larger ones which correspond to the triangular blotches of *T. jaculator,* the colouration of which is repeated in the juvenile *T. chatareus,* but later on reduced to the definite oval or roundish spots, while usually three smaller spots are intercalated (see Fig. 53); soft dorsal at its anterior and posterior angel and the outer half of the anal blackish. Length 270 mm.

Nomen indig. Sumpit (Serawak, Borneo).

Habitat: Pinang; Singapore; Sumatra (Belawan, Deli);

Borneo (Bandjermasin, Pontianak, Serawak); New Guinea (Lake Jarmur!, Fak Fak!, Lorentz-river and its affluents and other rivers discharging on the South coast of Dutch New Guinea!). — British India, Malay Peninsula, Peninsular Siam!, Cochinchina, North west and South Australia. In rivers and estuaries.

5. **Toxotes oligolepis** Blkr.

Toxotes oligolepis Bleeker, Versl. Akad. Amsterdam (2) IX, 1875, p. 162. — Atl. ichth. IX, 1877, p. 3.
Toxotes oligolepis Fowler, Fish. Oceania, Bishop. Mus. X, 1928, p. 242.
Toxotes oligolepis Fowler & Bean, Bull. U. S. Nat. Mus. VIII, 1929, p. 32.

B. 7. D. 5/12 P. 2/11. V. 1/5. A. 3/16 vel 3/17. C. 1/15/1 et lat. brev. Toxot. corpore oblongo-ovali, altitudine spinam analem anteriorem inter et spinam dorsalem anteriorem 3 circ. in ejus longitudine, latitudine 2 circ. in diametro dorso-anali; capite acuto 3 et paulo in longitudine corporis, longiore quam alto: oculis diametro $3^1/_3$ circ. in longitudine capitis, diametro 1 circ. distantibus; linea rostro-frontali rectiuscula, rostro acuto oculo paulo breviore; maxilla superiore sub pupilla desinente; osse supramaxillari squamato; ossibus suborbitalibus anterioribus et praeoperculo margine inferiore conspicue denticulatis; squamis angulum aperturae branchialis superiorem inter et basin pinnae caudalis supra et infra lineam lateralem in serie 23 vel 24 transversas dispositis; squamis 22 circ. in serie longitudinali linea rostro-dorsali mediana nares posteriores inter et spinam dorsalem 1^m, 14 vel 15 in serie transversa spinam ventralem inter et lineam dorsi medianam et spinam analem 1^m inter et spinam dorsalem 1^m quarum 4 (3½) apicem curvaturae lineae lateralis inter et lineam dorsi medianam, 3 lineam lateralem inter et vaginam pinnae dorsalis spinosae squamosam; linea laterali flexura anteriore interrupta parte posteriore spinis dorsalibus anterioribus opposita; pinna dosrali vix ante analem incipiente, spina 1a oculo multo breviore, spina 3a ceteris longiore diametro dorso-anali duplo circ. breviore, parte radiosa spina posteriore humiliore convexa; pectoralibus acutis capite absque rostro longioribus; ventralibus pectoralibus multo sed minus duplo brevioribus; anali spina 3a ceteris longiore capitis parte postoculari breviore, parte radiosa rotundata parte spinosa non humiliore, duplo circ. longiore quam alta; caudali extensa medio vix emarginata angulis acutiuscula capite absque rostro vix breviore; colore capite superne dorsoque fusco, lateribus et inferne flavescente, griseo vel argenteo; iride flavescente vel rosea; corpore superne fasciis 5 latis transversis fuscis brevibus cum fusco dorsi confluentibus, non infra media latera descendentibus, anteriore

nucho-operculari, 2a dorso-suprascapulari, 3a ex parte sub dorsali spinosa, 4a sub dorsali radiosa, 5a caudali; pinnis flavescentibus, dorsali maculis vel fasciis fuscis vel nigris nullis; anali unicolore. (After Bleeker).

Habitat: Bleeker's description is based on a single specimen of 141 mm. length, which came probably from the Island Buru. Fowler (l.s.c.) writes about this species: „Two in the National Museum from New Guinea, 165 and 203 mm. long." This habitat is not repeated in the later publication of Fowler & Bean (1929). Bleeker thinks it possible, that the specimen of *T. jaculator* mentioned by Cuvier & Valenciennes in their Histoire nat. Poissons VII, 1831, p. 314 and figured in Règne animal, Poissons, 1839, pl. 44, fig. 3 as coming from Buru, also belongs to the present species.

Note. Dr Herre was so kind to inform us, that he secured on his last trip to the Philippines in 1931 *Toxotes oligolepis* Blkr.

22. Family MONODACTYLIDAE

(Psettidae auctores)

Strongly compressed elongate, to short and ovoid or more or less strongly elevated, head and body covered with small or moderate feebly ctenoid or cycloid (Schuettea) scales continued as a thick covering of minute scales on median fins, lateral line complete, more or less arched, according to height of body. Mouth terminal of moderate width, oblique, protractile, maxillary exposed, supramaxillary wanting. Branchiostegals six, gillmembranes free from isthmus; four gills, a slit behind the fourth; pseudobranchiae large, gillrakers 16—24. Small villiform teeth on jaws, vomer, palatines and tongue. Two approximate nostrils close to large eye. The single dorsal and anal long, the former with five to eight spines, the anterior of which may be reduced and isolated; anal with three spines. Pectorals short, ventrals thoracic, when normally developed, as in Schuettea, with a spine, 5 rays and an axillary process, smaller than pectorals or the ventrals are strongly reduced in size or nearly vestigial, with a short spine and two to three or four minute rays shorter than spine. Caudal slightly emarginate or forked (Schuettea). Vertebrae 24 (10 + 14), with or without a subocular shelf.

Distribution: Marine costal fishes of moderate size of the indopacific region, with one atlantic representant along the tropical coast of West-Africa and one in Australia; entering brackish water of rivers and living also in fresh water of rivers above tidal mark and in lakes.

1. **Monodactylus** Lacépède.

(Lacépède, Hist. Nat. Poiss. III 1802, p. 131). type M. falciformis Lac.
Psettus Cuvier, Règne Animal II, 1817, p. 336; autores.

Ovoid or more or less strongly elevated, scales ctenoid, lateral line strongly arched. Eight dorsal spines; ventrals close to anus, minute but otherwise normally developed or vestigial with minute spine and two to four reduced rays; caudal superficially emarginate.

Distribution that of the family.

1. **Monodactylus argenteus** (L).

Chaetodon argenteus Linnaeus, Syst. nat. ed. X, 1758, p. 272 1).
Scomber rhombeus Forskål, Descr. Animal. 1775, p. 58.
Centrogaster rhombeus Gmelin, Syst. nat. Linn. I, 1789, pp. 13, 38.
Scomber rhombeus Bloch, Schneider, Syst. Ichth. 1801, p. 34.
Chaetodon argenteus Bloch, Schneider loc. cit., p. 230.
Centropodus rhombeus Lacépède, Hist. nat. Poiss. III, 1802, pp. 303, 304.
Acanthopodus argenteus Lacépède, loc. cit. IV, pp. 558, 559.
Psettus rhombeus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 245.
?*Psettus Commersonii* Cuvier & Valenciennes, loc. cit., p. 250.
Psettus argenteus Richardson, Voy. Erebus & Terror, Ichth. 1844—1848, p. 57.
Psettus argenteus Richardson, Ichth. China & Japan 1845, p. 246.
Psettus rhombeus Bleeker, Nat. Geneesk. Arch. Ned .Indië (3) II, 1845, p. 521. — Verh. Batav. Gen. XXIII (1849) 1850, p. 29.
Monodactylus rhombeus Cantor, Journ. Asiat. Soc. Bengal XVIII (1849) 1850, p. 1154.
Psettus rhombeus Rüppell, Samml. Senckenberg. Mus., 1852, p. 10.
Psettus rhombeus Peters, Monatsber. Akad. Berlin, 1855, p. 439.
Monodactylus argenteus Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 242.
Psettus argenteus Günther, Cat. Brit. Mus. II, 1860, p. 487.
Psettus argenteus Kner, Novara-Exp. Fische, 1865—67, p. 164.
Psettus argenteus Day, Fish. Malabar 1865, p. 99.
Psettus argenteus Playfair in Playfair & Günther, Fish. Zanzibar, 1866, p. 64.
Psettus argenteus Steindachner, Fishfauna Port Jackson 1866, p. 418.
Psettus argenteus Klunzinger, Verh. Zool. Bot. Ges. Wien XX, 1870, p. 794.
Psettus argenteus Günther, Fische Südsee, 1876, p. 140.
Psettus argenteus Günther, Challenger Exp. Rep. VI, 1880, p. 35.
Psettus argenteus Macleay, Cat. Austral. Fish. I, 1881, p. 181.
Psettus argenteus Klunzinger, Fische Roth. Meer 1884, p. 117.
Psettus argenteus Day, Fish. India 4° 1878—1888, p. 235. —Fauna Brit. India, Fish. II, 1889, p. 180.
Psettus argenteus Sauvage, Poiss. Madagascar, 1891, p. 518.

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1) Cfr. Lönnberg, Bih. Svenska Akad. XXII, 1896, No. I, p. 30.

Psettus argenteus Steindachner, Denkschr. Akad. Wien LXXI,, 1902, p. 144.
Psettus argenteus Duncker, Mitth. Nat. Mus. Hamburg XXI, 1904, p. 157.
Psettus argenteus Pellegrin, Bull. Soc. Zool. France XIII, 1905, p. 83.
Monodactylus argenteus Jordan & Seale, Bull. Bur. Fish. XXVI, (1906) 1907, p. 237.
Psettus argenteus Lloyd, Rec. Indian Mus. I, 1907, p. 227.
Psettus argenteus Regan, Trans Linn. Soc. London (3) XII, 1908, p. 254.

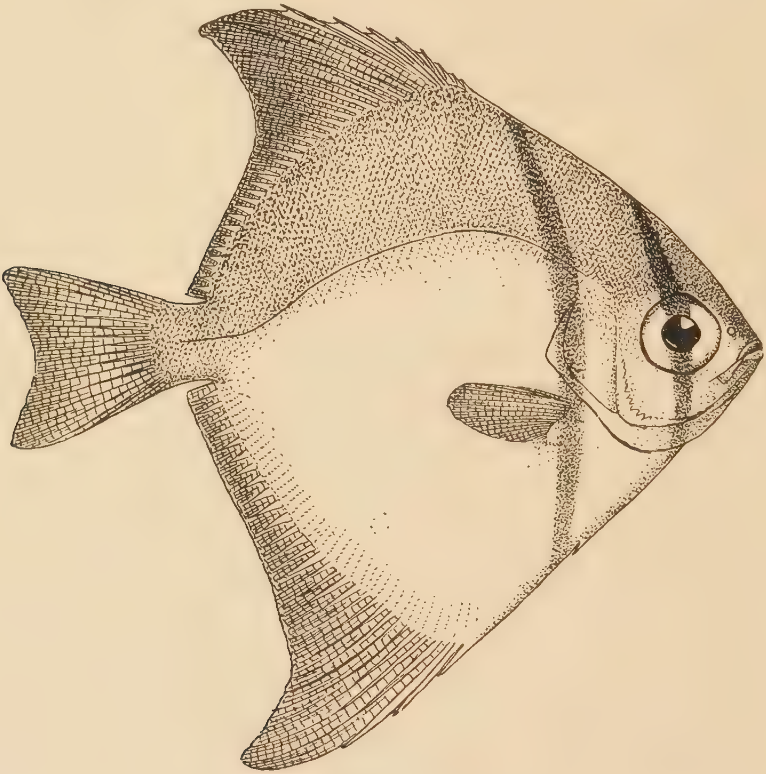

Fig. 54. *Monodactylus argenteus* (L.) × 4/3.

Psettus argenteus Waite, Trans. N. Zeal Inst. XLII (1909) 1910, p. 381.
Monodactylus argenteus Seale, Philippine Journal Sci. V, 1910, p. 282.
Monodactylus argenteus Jordan & Starks, Ann. Carnegie Mus. vol. XI, 1917, p. 457.
Monodactylus argenteus Fowler & Bean, Proc. U.S. Nat. Mus. LXII, 1922, p. 21.
Monodactylus argenteus Mc Culloch, Check List Fish. N.S. Wales, Austral. Zoolog. II, Part III, 1922, p. 89.
Monodactylus argenteus Chaudhuri, Mem. Ind. Mus. V, 1923, p. 734.
Monodactylus argenteus Barnard, Ann. S. Afric. Mus. XXI, 1925—1927, p. 640.

Monodactylus argenteus Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 240.
Psettus argenteus Duncker & Mohr, Mitt. Zool. Mus. Hamburg XLIV, 1929, p. 74.
Mondactylus argenteus Fowler & Bean, U.S. Nat. Mus. VIII, 1929, p. 13.
Monodactylus argenteus Herre, Journ. Pan-Pacific Res. Instit. VI, 1931, p. 12.
Monodactylus argenteus Herre, Notes, Fish. Zool. Mus. Stanford Univ. 1931, p. 58.
Psettus argenteus Delsman & Hardenberg, Ind. Zeevisschen, Batavia, 1934, p. 327.

D. VII—VIII, 28—30; A. III, 28—30.

Somewhat rhombic, elevated, height about 1 $^1/_3$ in lenght, head slightly more or less than thrice in length, about 2.5 in height of body. Eye 2.5 in head, equal to convex interorbital space; snout nearly $^1/_3$ shorter than eye diameter. Maxilla reaches below front border of eye. Angle of finely serrated preopercle rather angular. Anterior lobe of dorsal and anal falciform prolonged. Pectorals more or less than ½ of head. Ventrals close to vent and narrowly approximate, reduced to a very short spine and 2 to 3 rays shorter than spine. Caudal slightly emarginate, least height of its peduncle equal to eye. Silvery, often with a silvery hue, back brownish, dorsal and anal lobe terminally brownish, the fins paler; in young with a narrow brown band crossing eye, an other from nape through base of pectoral to frontborder of anal, genrally much paler in adult and fading in alcohol. Length up to 210 mm.

Nomen indig.: ·Bunga waru (Malay, Batavia).

Habitat: Singapore; Pinang; Banka; Biliton; Bintang; Pulu Weh (Sabang Bay!); Sumatra (Telokbetong, Benkulen, Siboga, Belawan!); Nias; Java (Batavia!); Borneo (Sandakan); Celebes (Makassar!); Batjan; Buru; Ambon!; Ceram; Halmaheira!; Obi major; Misol!; Goram; New Guinea. — Red Sea, Aden, Zanzibar, Mozambique, Natal, Madagascar, Bourbon, Mauritius, Seychelles, Sokotra, Muscat, India, Ceylon, Andamans, Tonkin, Southern China, Philippines, Australian coasts, Melanesian and Polynesian Islands till Fidji. In costal water, entering brackish water of mouth of rivers and freshwater of rivers.

Note: From the above described, widely spread indo-pacific specis differs *Monodactylus falciformis* Lac. by an ovoid body, a head about twice in body, a rounded anterior lobe of dorsal and anal, but principally by less reduced ventrals, which have still five rays, longer than the spine. It is known from the East coast of Africa to Natal, from Madagascar, Bourbon, British India and Southern China and seems to be a more continental form, living in estuaries and in freshwater of rivers above tidal influence. It is generally mentioned also from "Polynesia" which seems to be based on the supposition, that *Psettus commersoni* of Cuvier & Valenciennes, which they mention from Vanicolo, is identical with *falciformis*. This identification seems to us after the short diagnosis of Cuvier more than dubious; Cuvier himself was evidently inclined to identify it with *argenteus*.

23. Family PEMPHERIDAE.

Oblong-ovate to elliptical, generally strongly compressed, covered by small or moderate persistent ciliated or caducous cycloid scales, continued on head and median, at least anal and caudal fins; lateral line constituted by simple long and narrow or short and wide sensory tubes, anteriorly more or less curved, continued on caudal fin. Head obtuse, with short blunt snout and narrow preorbital. Mouth terminal, slightly protractile, its wide oblique gape bordered by the slender intermaxillary; maxillary exposed; no supramaxillary. Gillopenings wide, gillmembranes separate, free from isthmus, pseudobranchiae present; 6 to 7 branchiostegals; four gills, a slit behind the fourth; pharyngeals separate. Teeth in jaws small, pluriseriate, present on vomer and palatines. Eye anterior, large, without eyelid or moderate with an adipose eyelid. Two contiguous oval or round nostrils. The single dorsal usually short, more or less falciform with IV—VI, long anal with III graduated spines; ventrals inserted below pectorals, with a scaly axillary process, caudal with 15 branched rays. Vertebrae 24 (10 + 14).

Distribution: Marine fishes of small or moderate size from tropical and temperate waters of the Indo-Pacific and Western Atlantic, inhabiting costal water up to about 100 m depth; one genus enters the mouth of rivers.

Key to the indo-australian genera of Pempheridae.

1. Ovate; eye large without adipose eyelid; maxillary not reaching behind pupil; preorbital entire; seven branchiostegals; gillrakers numerous and long. . . 1. *Pempheris* p. 210.
2. Elongate, elliptical; eye small with anterior and posterior adipose eyelid; maxillary reaching far behind eye; preorbital serrulate; six branchiostegals, gillrakers few and short . . . . 2. *Leptobrama* p. 220.

1. **Pempheris** Cuvier.

(Règne Animal, ed. 2, II, 1829, p. 195. Type *P. touea* Cuvier).
Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 296.

Triacanthopsis Fowler, Proc. Acad. Nat. Sci. Philadelphia LVIII, 1906, p. 122.
Catalufa Snyder, Proc. U. S. Nat. Mus. XL, 1911, p. 528.

Strongly compressed, oblong, anteriorly more or less ovate, covered with moderate or small, persistent, more or less feebly ctenoid scales, continued on anal, caudal and head; lateral line curved, with short, wide sensory tubes extending on caudal fin. Head short with wide, strongly oblique gape of mouth; maxillary dilated posteriorly, not reaching behind pupil. Eye large, anterior, without adipose eyelid. Teeth in jaws pluriseriate, the outer series enlarged, conical and much stronger than the others, the anterior mandibulary ones partly directed forward and outward, or the teeth in jaws are setiforme and of equal size or even weak and rather rudimentary; teeth on vomer and palatines present. Seven brachiostegals, gillrakers long and numerous. Single premedian dorsal VI, 9; anal elongate, falciform with three spines; pectorals pointed, below middle of body, ventrals thoracic, approximate, short with I, 5; caudal emarginate.

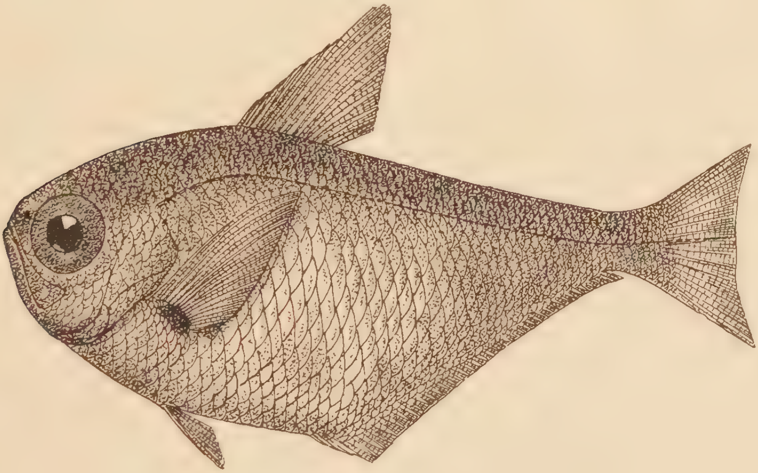

Fig. 55. *Pempheris oualensis* C.V. × 3/4.

Distribution: Small, seemingly gregarious living fishes, inhabiting costal water till about 100 m. depth in the tropical and temperate part of the Indo-Pacific and West-Atlantic.

Note: The position of *Pempheris* has of old been a taxonomic difficulty. No less the discrimination of the seven species described by Cuvier and his contemporaries from indian seas. Bleeker has in 1876 put in its proper light that neither their physionomy nor the usual measurements of their body are of any real help to distinguish them. This is also the case with the squamation which in most species shows about the same formule, besides that its counting is often insecure by the character of the squamation. The dorsal fin is of uniform construction; the anal shows only slight differences of specific value, the more so, as the number of rays varies individually in the same species. It is the merit of Bleeker to have indicated in the first place the character of the dentition, in the second place the proportion of height to length of the head; the relative length of the upper jaw and the character of the rostrofrontal profile, already remarked by Cuvier, as a means to distinguish the species. Of some help may finally be the presence or absence of a blackish patch at the base of the pectorals, which is apt to be kept even in specimens long time preserved in liquor, as already Cuvier stated. This is generally less the case with a blackish top or a blackish anterior border of the dorsal. The principal distinguishing chtracter of the dentition used in our key, was incidentally already mentioned by Kner (1865) who compared the forwards directed mandibulary teeth of some species of *Pempheris* with those of the Characinidae *Epicyrtus* Müll. & Troschel 1844 (= *Anacyrtus* Gthr. 1864) and *Exodon* Müll. & Troschel 1844 (= *Hystricodon* (Gthr. 1864). Kner was partly misunderstood by Klunzinger (1884) who wrongly supposed that Kner saw in the stronger and more complicated dention of some species of *Pempheris* only a sexual character.

Key to the indo-australian species of Pempheris.

I. Teeth in jaws relatively strong, their outer series, at least anteriorly, enlarged, conical, the anterior mandibulary ones partly directed outwards and forwards and visible from below. L.l. with more than 50 scales. Head higher than long.

  1. Rostro-frontal line nearly straight, interorbital space slightly convex to flattened, upper rim of eye nearly level with it. Pectorals without a basal blackish spot; dorsal at most with darker border. . . . . . . 1. *P. moluca* p. 213.
  2. Rostro-frontal line convex, interorbital space strongly convex, upper border of eye distant from its profile. Pectorals with a basal blackish spot; dorsal with conspicuous blackish or fuscous top . . . . 2. *P. oualensis* p. 216.

II. Teeth in jaws smaller, setiform, outer series in intermaxillary enlarged; no forward directed teeth in mandible. L.l. with more than 50 scales. Head higher than long or height and length about equal.
  1. Distance of dorsal from point of snout in adult equal to height of body or nearly so. Pectorals with basal blackish patch; dorsal with anterior blackish or fuscous border. Rostro-dorsal profile convex. . . . . . 3. *P. otaitensis* p. 217.
  2. Distance of dorsal from point of snout conspicuously less than height of body. Pectorals without basal dark patch; dorsal with apical dark patch. Rostro-dorsal profile convex to nearly straight . . . . 4. *P. vanicolensis* p. 218.

III. Teeth in jaws minute, in a brushlike band, rather rudimentary. L.l. with less than 50 scales. Head longer than high, its frontal profile concave. Pectorals without basal blackish patch; top of dorsal and margins of caudal blackish, base of anal dark . . . . 5. *P. schwenki* p. 219.

1. **Pempheris moluca** C.V. (Fig. 56).

Pempheris moluca Cuvier & Valenciennes, Hist. Nat. Poissons VII, 1831, p. 304.
Pempheris nesogallica Cuvier & Valenciennes, ibidem.
?*Pempheris malabarica* Cuvier & Valenciennes, l.c. p. 308 [1]).
Pempheris moluca Bleeker, Nat. Geneesk. Arch. Ned. Indië (3) II, 1845, p. 521. — Verh. Batav. Gen. XXIII (1849) 1850, p. 30.
Pempheris molucca Cantor, Journ. Asiat. Soc. Bengal. XVIII (1849) 1850, p. 1157.
Pempheris mangula Bleeker, Verh. Batav. Gen. XXV, 1853, p. 42. (nec syn. p.p.).
Pempheris moluca Bleeker, ibidem.
?*Pempheris mangula* Günther, Cat. Brit. Mus. II, 1860, p. 509 (Combination of not seen species).
Pempheris molucca Günther, ibidem.
Pempheris molucca Day, Fish. Malabar. 1865, p. 108.
Pempheris mangula Bleeker, Arch. Néerl. Sc. Nat. XII (1876) 1877, p. 45. — Atl. ichth. IX, 1877, p. 6 (nec C.V.).
Pempheris mangula Day, Fish. India 4° 1878—1888, p. 175 (nec C.V.) (in Supplement p. 788 changed in malabarica C.V.) [1]).
Pempheris malabarica Day, Fish. British India II, 1889, p. 100.
Pempheris mangula Sauvage, Poissons Madagascar 1891, p. 285.
Pempheris mangula Pellegrin, Bull. Soc. Zool. France XIII, 1905, p. 84.

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[1]) Cuvier & Valenciennes have added a query to the specific name *malabarica* of their badly preserved specimens and doubt their validity; they add that they do not know to distinguish them from other Pempherides from the Moluccos.

?*Pempheris molucca* Gilchrist & Thompson, Ann. S. African Mus. VI, 1908, p. 178.
Pempheris molucca Pellegrin, Bull. Soc. Zool. France XXXIX, p. 124.
Pempheris mangula Barnard, Ann. S. African Mus. XXI, 1925—27, p. 666.
?*Pempheris mangula* Mochan, Ann. Naturhist. Mus. Wien XLIV, 1930, p. 436.
Pempheris macrolepidotus Fowler, U. S. Nat. Mus. XI, 1931, p. 51.

D. VI, 9; A. III, 41; L.l. ca 64—66.

Height 2.6—2.8 in length, 2.2—2.4 without caudal; head 4.1 in length, 3.5 without caudal, slightly higher than long. Rostro-dorsal profile nearly not convex, interorbital space slightly convex to flattened, especially in young specimens; the upper rim of eye nearly level with it; ventral profile slightly convex to ventrals, behind them flattened. Diameter of eye 2—2.5 in length of head, interorbital space 1.6 in diameter of eye. Maxillary 1.7 in length of head, its hindborder somewhat surpassing middle of pupil. Distance of dorsal from point of snout shorter than height of body. Intermaxillary and mandibulary teeth for a Pempheride relatively strong, their outer series strongest, the anterior mandibulary ones partly directed forward and outward and thereby visible from below. Colour with silvery reflex, a brownish tint stronger towards back, a coppery tint on the flanks, base of pectorals without a black or brownish patch, vertical fins reddish in life. Lenght up to 140 mm. (Description after two typical specimens of *P. mangula* of Bleeker in the Leiden Museum).

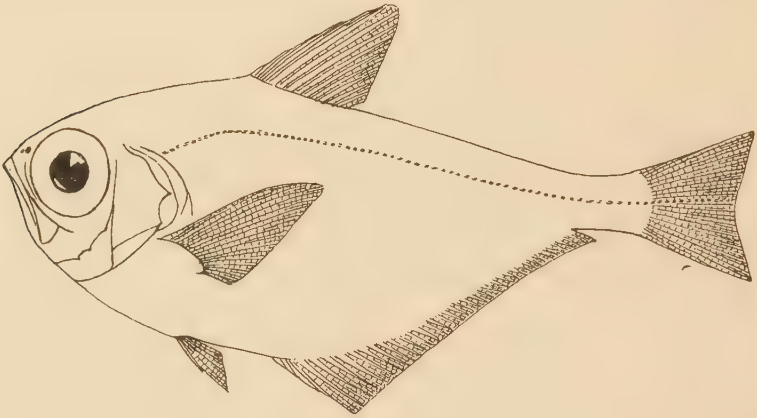

Fig. 56. *Pempheris moluca* C.V. × 5/6. One of the types of *P. mangula* from Bleeker's collection.

Habitat: Pulu Weh (Sabang Bay!); Java (Batavia!, Java Sea); Celebes (Makassar!).

Note: Into the synonymy of *P. moluca* C.V. we have admitted what Bleeker called *mangula* C.V. since a comparison of two typical specimens of his collection in the Leiden Museum, with Cuvier's description of *moluca* C.V. convinced us of their identity. More important was that Dr. Koumans confirmed this identity when comparing them with one of the typical specimens of *moluca* collected by Reinwardt in the Leiden Museum. Dr. Pellegrin had the kindness to compare our description, made after the specimens of *mangula* sensu Bleeker, with the example which used Cuvier for his description of *moluca;* he also stated their identity. He added in his letter the following important fact: ,,Cuvier & Valenciennes (VII, p. 306) écrivent que la ligne du profile n'est pas convex entre les yeux, mais y prend un peu de concavité; ce qui fait que le bord supérieur de l'oeil s'y élève un peu au dessus, et fait saillie sur le profil. Cela est parfaitement exact pour l'exemplaire de Reinwardt qui a servi à la description, mais ce caractère provient d'une blessure cicatrisée du vivant de l'animal ou d'une malformation, il y a en effet, une espace sans écailles, au dessus de l'oeil gauche, qui a déterminé cette petite concavité. Tous les autres exemplaires ont l'espace interorbitaire écailleux et légèrement convex".

P. mangula Cuvier & Valenciennes (t. VII, 1831, p. 304) is a dubious species as it is not based on an authentic specimen, but manifestly made after the description and figure of Russell (Fish. of Vizagapatam II, 1803, fig. CXIV). Both show clearly that they do not refer to *moluca* C.V. as the interorbital profile is quite different, besides Russell calls the teeth very small. It seems to us not improbable, that they come nearest to *P. vanicolensis* C.V. Day (Fish. India 4°, p. 175) united Russell's species with a fish the interorbital of which he described a slightly concave, as in *moluca* C.V. He rejected afterwards this interpretation in his Supplement 1888, p. 788 and changed the name *mangula* C.V. in *malabarica* C.V.: a more than doubtful species, as shown in our synonymy. On the same place he changed the name of a fish he had described (on page 175) as *moluca* C.V. in *russelli* and declared it identical with *mangula* Blkr. (not. C.V.), of which we now know, that it is a synonym of *moluca* and of *P. rhomboideus* Kossmann and Räuber. According to Klunzinger (Fische Rothes Meer, 1884, p. 81), this species is identical with Klunzinger's *mangula* from the Red Sea, of which he has shown, that it differs from *moluca* C.V. and from *mangula* Blkr. by its dentition and interorbital space and is probably Russell's fish and is perhaps wanting in the Archipelago. Its synonymy is involved not only by Day's erroneous interpretations but more so by the neglect of the majority of authors of the behavior of the dentition; even by Fowler, the latest author about the Pempheridae (U.S. Nat. Mus. XI, 1931, p. 45), who cites f.i. Bleeker's unmistakeable *mangula* in the synonymy of *macrolepidotus* (Schneider) which is after him identical with *moluca* C.V. and again in the synonymy of *mangula* C.V. As long as the character of the dentition is neglected, it will be difficult to identify the meaning of the listed species of Pempheris, especially if the added diagnosis is short. Of thise listed species Fowler has otherwise given an admirably complete review.

2. **Pempheris oualensis** C.V. (Fig. 55)

Pempheris oualensis Cuvier & Valenciennes, Hist. Nat. Poiss. VII, 1831, p. 299.
Pempheris oualensis Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 242 (p.p.).
?*Pempheris otaitensis* Günther, Cat. Brit. Mus. II, 1860, p. 508.
Pempheris otaitensis Kner, Fische Novara-Exp. 1865—67, p. 171. (nec. C.V.)
Pempheris mangula Günther, Fische Südsee 1873—75, p. 92. (nec. C.V.).
Pempheris oualensis Bleeker, Arch. Néerl. Sc. nat. XII (1876) 1877, p. 47. — Atl. ichth. IX, 1877, p. 6.
Pempheris oualensis Steindachner, Sitz. Akad. Wien CXV, 1906, p. 1376.
Pempheris oualensis Jordan & Seale, Bull. Bur. Fish. XXV (1905) 1906, p. 236.
?*Pempheris oualensis* Snyder, Proc. U.S. Nat. Mus. XLII, 1912, p. 497. (name only).
Pempheris oualensis M. Weber, Fische Siboga-Exp. 1913, p. 192.
Pempheris oualensis Ogilby, Mem. Queensland Mus. II, 1913, p. 66.
Pempheris oualensis Herre, Notes on fishes Stanford Univers. I, Herre Philippine Exp. 1931, Hongkong 1934, p. 48. (name only).
Pempheris oualensis Fowler, U.S. Nat. Mus. XI, 1931, p. 59. (salve synon.).

D. VI, 9; A. III (39) 42—43 (45). L.l. ca. 55—60.

Rostro-dorsal profile in its middle slightly convex, before and behind it more or less straight, ventral profile strongly convex from chin to ventrals, behind them less so; height 2.2—2.4 in length, 2.5—2.7 in length with caudal; head somewhat higher than long, 3.5—3.9 in length, 3.9—4.4 in length with caudal. Eye 2.2—2.6 in head, interorbital space 1.4—1.6 in eye, according to length. Maxilla passing frontborder of pupil, 1.76 to twice in head. Distance of dorsal from tip of snout conspicuously less than height of body. Height of dorsal and lenght of pectorals about equal and about equal to lenght of head. First ray of ventrals somewhat longer or shorter than half length of head, its spine $^1/_5$ shorter. Teeth in jaws, palatines and vomer conspicuous, outer series of intermaxillary and mandibulary ones strongest, the anterior mandibulary ones somewhat forward inclined; triangle of vomer anteriorly rounded. Head and back ligther or darker brown, ligther to silvery below, the scales sprinkled with small blackish or bronze coloured spots, which may increase in size, especially on breast, opercles and head, finally flow into one another and give the fish a copper colour; dorsal with a blackish frontborder extending on top; anal uniform light, occasionally with a brown border; caudal totally dark, or its borders only, at least their tops; pectoral with a blackish basal patch. Length 180 mm.

Habitat: Pulu Weh!; Nias!; Java (Batavia!, Java Sea); Celebes (Menado, Tombariri); Timor; Ternate; Gisser!; Binongka!; Ambon!; Halmahera. — Australia, Melanesia, Polynesia, Philippines (Culion after Herre).

3. **Pempheris otaitensis** C.V.

Pempheris otaitensis Cuvier & Valenciennes, Hist. Nat. Poiss. VII, 1831, p. 304.
Pempheris otaitensis Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 242 (p.p.).
Pempheris otaitensis Günther, Cat. Brit. Mus. II, 1860, p. 508.
Pempheris otaitensis Bleeker, Arch. Néerl. Sc. Nat. XII (1876) 1877, p. 51. — Atl. ichth. IX, 1877, p. 8.
Pempheris adustus Bleeker, l.c. p. 50 et l.c. p. 7.
Pempheris otaitensis Macleay, Proc. Linn. Soc. N. S. Wales VIII, 1883, p. 265 (name only).
Pempheris otaitensis Meyer, Ann. Soc. Española Hist. Nat. XIV, 1885, p. 23. (name only).
Pempheris otaitensis Sauvage, Poissons Madagascar 1891, p. 286.
Pempheris otaitensis Seale, Occas. Papers Bishop Mus. I, 1901, p. 74.
Pempheris otaitensis Regan, Ann. Durban Mus. I, 3, 1916, p. 169. (name only).
Pempheris otaitensis Gilchrist & Thompson, Ann. Durban Mus. I, 4, 1917, p. 320 (salve synonyma).
Pempheris otaitensis Barnard, Ann. S. African Mus. XXI, 1925—27, p. 666.
Pempheris otaitensis Fowler, Fishes Oceania, Bishop Mus. X, 1928, p. 191. (pro parte).
Pempheris otaitensis Herre, Journ. Pan-Pacific Res. Instit. VII, 1932, p. 4. (name only).

D. VI, 9 (—10); A. III, 39—41; L.l. 55—65.

Rostro-dorsal profile slightly convex; ventral profile strongly convex. Height 2.4—2.5 in length, nearly thrice in length with caudal; head somewhat higher than long, 3.5—3.7 in length, more than 4 to nearly 5 in length with caudal. Eye 2 or somewhat more in head, interorbital space 1.3—1.5 in eye. Upper jaw reaching to anterior part of pupil 1.6—1.8 in head. *Distance of dorsal from tip of snout equal to height of body or nearly so.* Height of dorsal and length of pectorals about equal and about equal to length of head. Teeth setiform, the outer intermaxillary series only slightly or nearly not longer than the others, and no projecting teeth; the vomerine triangle anteriorly not rounded but angular. Brownish or fuscous, the scales having a densely spotted or complete brown centre, white or silvery below, frontborder of dorsal blackish, as also base of pectoral; base of anal dark, its anterior part blackish, caudal fuscous, Length 175 mm.

Habitat: Pulu Weh (Sabang Bay)!; Borneo (Balikpapan!); Celebes; Ambon; Banda; New Guinea (Hood Bay). — Madagascar, Natal coast, Cebu, Marianas, Western Pacific, Tahiti.

4. **Pempheris vanicolensis** C.V.

Pempheris vanicolensis Cuvier & Valenciennes, Hist. Nat. Poiss. VII, 1831, p. 305.
? *Pempheris nesogallica* Cuvier & Valenciennes, l.c. p. 306.
Pempheris moluca Bleeker, Verh. Batav. Gen. XXXIII (1849) 1850, Chaetodont. p. 30 (p.p.).
Pempheris moluca Rüppell, Samml. Senckenberg. Mus. 1852, p. 10. (nec C.V.).
Pempheris mangula Kner, Fische Novara-Exp. 1865—67, p. 171. (nec. C.V.).
Pempheris vanicolensis Bleeker, Arch. Néerl. Sc. Nat. XII (1876) 1877, p. 218. — Atl. ichth. IX, 1877, p. 7.
Pempheris vanicolensis Jordan & Seale, Bull. Bureau Fish. XXV (1905) 1906, p. 236.
Pempheris vanicolensis Evermann & Seale, Bull. Bureau Fish. XXVI, 1907, p. 75.
Pempheris vanicolensis M. Weber, Fische Siboga-Exp. 1913, p. 193.
Pempheris vanicolensis Ogilby, Mem. Queensland Mus, II, 1913, p. 66.
Pempheris vanicolensis Fowler, U. S. Nat. Mus. XI, 1931, p. 58.
Pempheris vanicolensis Herre, Notes on fishes Stanford Mus. I. Fishes Herre Exp. 1931. Hongkong 1934, p. 48.

D. VI, 9; A III, 39—43. L.l. 55.

Rostro-dorsal profile slightly convex; height 2.2—2.4 in lenght, 2.6—2.8 in lenght with caudal; head only slightly higher than long or equal to its length, 3.3—3.8 in length, 4—4.6 in length with caudal. Eye 2.1—2.5 in head; interorbital space 1.3—1.7 in eye. Upper jaw 1.7 in head, reaching behind anterior border of pupil. Distance of dorsal from tip of snout conspicuously less than height of body. Height of dorsal less than lenght of head and nearly equals length of pectorals, which is about twice length of spine of ventral. Teeth in jaws small, forming a rather narrow setiform band of nearly equal teeth, the outer series of the intermaxillary ones stronger than the others. Brownish or fuscous, head and back somewhat darker, inferiorly ligther or silvery, the scales more or less with darker points; dorsal with dark brown top; pectorals without blackish basal patch or band; anal anteriorly with brown top or its front border occasionally brown edged, as also caudal. Length 180 mm. [Specimens of Bleeker's collection in Amsterdam and Leiden Museum seen by us.].

Habitat: Singapore; Java (Batavia); Sabang!; Celebes (Makassar!); Sangir Id; Adonare!, Timor; Banda!; Ternate; Ambon. — Ceylon, New Guinea (Astrolabe Bay!, Stephans Ort!), Philippines, Queensland, Vanicolo, Ile de France, Samoa.

5. **Pempheris schwenki** Blkr.

Pempheris schwenki Bleeker, Nat. Tijdschr. Ned Indië, VIII, 1855, p. 314. — Arch. Néerl. Sc. Nat. XII, 1876, p. 53. — Atl. ichth. IX, 1877, p. 8.
Pempheris schwenki Norman, Ann. Mag. Nat. Hist. (9), 1922, p. 320.
Pempheris schwenki Barnard, Ann. S. African Mus. XXI, 1925—1927, p. 667.
Pempheris schwenki Fowler, U.S. Nat. Mus. XI, 1931, p. 50.

D. VI, 9—10; A. III, 36—37; L.l. 45.

Oblong, compressed, frontal profile concave, thence continued in the convexity of the back which is less than the convexity of the ventral profile, the anterior part of which is carinat and continued in a flat triangle before the insertion of the ventrals. Height about 2.4 in length, thrice in length with caudal; head, which is somewhat longer than high, 3.6 in length, about 4.4 in length with caudal. Upper jaw raching pupil, 1.8 in length of head. Eye 2.2 in head, its upper border about level with flat interorbital space which goes 1.3 in diameter of eye. Distance of dorsal fin from point of snout slightly less than height of body. Teeth minute in a brushlike band in jaws. Length of dorsal thrice in length of anal; pectorals slightly shorter than head; ventrals twice shorter than head, their spine reaching vent. Fuscous above, silvery below; after Bleeker the fins rosy, top of dorsal blackish or fuscous, base of anal blackish-violet, caudal above, below and posteriorly with a blackish or fuscous border, base of pectorals with black patch.

Length 119 mm.

[Diagnosis after one of the two specimens of Bleeker in the Leiden Museum.]

Habitat: Batu Isd; Sumatra (Trussan). — Natal coast.

2. **Leptobrama** Steindachner.

(Steindachner, Sitz. Akad. Wien LXXVIII, 1878 (1879), p. 388. Type müllleri Steind.)
Neopempheris Macleay, Proc. Linn. Soc. N. S. Wales V, 1880, p. 517.

Elongate, elliptical, covered with small, persistent ciliated scales, arranged in regular, longitudinal series, smaller on head and breast and continued on base of median fins, lateral line with a distinct curve anteriorly, with rather long, narrow sensory tubes. Head small, conical; snout obtusely pointed, short, naked; cleft of mouth wide, oblique, reaching behind eye, bordered by the slender intermaxillary; maxillary spatulate. Jaws equal with small, reflexed cardiform teeth, increasing in size from without, largest on mandibulary, present on vomer, palatines, pterygoids and tongue. Eye anterior with adipose eyelids. Two nostrils at some distance from eye, anterior ovate, posterior arcuate, wider. Operculum not armed; preoperculum with the lower border serrulate, its angel produced. Six branchiostegals. No airbladder nor pyloric caeca. The single dorsal postmedian, emarginate with IV strong, pungent spines; anal originating before dorsal, falciform, long with III spines. Pectorals rather short, ventrals below them, short with a weak flexible spine and four rays, with a scaly axillary process. Caudal deeply emarginate.

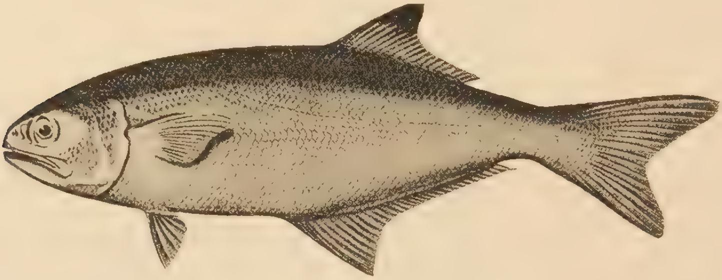

Fig. 57. *Leptobrama mülleri* Steindachner. ♂. 2/3 n.s. After Mc Culloch.

Distribution: that of the single species known.

1. **Leptobrama mülleri** Steindachner (Fig. 57).

Leptobrama mülleri Steindachner, Sitz. Akad. Wien LXXVIII, 1878, p. 388; Denksch. Akad Wien XLI, 1879, Taf. III, Fig. 1.
Leptobrama mülleri Klunzinger, Sitz. Akad. Wien LXXX, 1879, p. 379.
Neopempheris ramsayi Macleay, Proc. Linn. Soc. N.S. Wales V, 1881, p. 517. — Descr. Cat. Austral. Fisch. I, 1881, p. 152.

Leptobrama müllern Steindachner, Sitz. Akad. Wien LXXXVIII, 1883, p. 1108, note.
Neopempheris pectoralis Ramsay & Ogilby, Proc. Linn. Soc. N.S. Wales XII, 1887, p. 563.
Leptobrama mülleri Mc Culloch, Rec. West. Austral. Mus. I, 1913, p. 214.
Neopempheris ramsayi Cockerell, Mem. Queensland Mus. II, 1913, p. 54.
Leptobrama mülleri Ogilby, loc. cit. p. 64.
Leptobrama muelleri Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 191.
Leptobrama muelleri Mc Culloch, Chek-List Fish. Australia II, 1929, p. 235.
Leptobrama mülleri Fowler, U.S. Nat. Mus. XI, 1931, p. 64.

D. IV, 16—18; A. III, 26—28; L.l. 75—77; L.tr.$\frac{10-12}{12-13}$.

Height 2.85—3.3; head 4.33—4.5; ventral contour somewhat less or somewhat more arched than dorsal, which is gently rounded or linear and feebly acclivous between forehead and dorsal fin. Caudal peduncle 0.3—0.5 longer than deep, its least depth 3.1 to 3.25 in depth of body. Snout with rounded profile, its length 1.1 to 1.4 in eye-diameter. Interorbital region strongly convex, its width from one tenth more to one fifth less than eye-diameter; adiopose eye-lid extending well on snout and postorbital region but not reaching pupil before or behind. Jaws equal, maxillary extending far behind eye,the width of its distal extremity 7.4 to 7.75 in its length. Dorsal nearer to root of caudal than to tip of snout. Anal originating in advance of middle of body, as high as or slightly lower than and from 0.5 to 0.66 longer than dorsal. Pectorals with 17 rays, as long as or longer than head without snout, fourth ray longest. Ventral spine long, but weak and flexible, the outer ray longest, 1.85 to 2 in length of head and 1.9 to 2.15 in its distance from the anal, which is 1.05 to 1.25 in that from the tip of the mandible. Silvery, with the back steal-blue, the line of demarcation well defined. Fins dusky, the produced portion of dorsal lobe with or without a black or dark chestnut brown blotch. Length 300 mm. (After J. D. Ogilby, not seen by us).

Distribution: British New Guinea, Aird River, 30 miles above its mouth. — Coast of Queensland and West Australia.

24. Family KYPHOSIDAE.

Oblong-oval, covered on body with regularly arranged ctenoid scales of medium or small size, smaller on head, back, breast and soft parts of median fins, which last they densely or at least basally cover, forming a low sheath for the dorsal and anal spines; lateral line complete, slightly arched. Eye lateral, about in middle of head. Two approximate nostrils before eye, the posterior close to it as an oval slit, the anterior smaller, rounded with a rim. Mouth terminal, small, horizontal, moderately protractile, distal part of maxillary exposed, or covered by large infraorbital bone, no supramaxillary. Gillmembranes separate, or united to isthmus; seven branchiostegals; pseudobranchiae present, gillrakers long; hind edge of opercle with one or two blunt spines, preopercle minutely serrate. Jaws with an outer series of lanceolate, narrow, strong incisors implanted by a horizontal posterior basal process; behind them a narrow band of villiform teeth, fine teeth on vomer, palatines and tongue or with tricuspid incisors widening towards cusps; the outer series the longest, behind them some series of smaller ones, the last almost setaceous and palate toothless. A single dorsal, its spinous part with X—XI spines depressible in a scaly sheath, about as long as or much longer than soft part with 12—15 rays; anal III, 11—16; pectorals rounded or acute; ventrals acute with a spine and 5 rays, originating behind base of pectorals, with a scaly axillary process; caudal emarginate with 15 branched rays. No subocular shelf; vertebrae 26 (9—10 + 16).

Distribution: Marine herbivorous fishes of moderate size, feeding on algae, living in shoals along coral reefs and rocky coasts in all tropical and subtropical seas.

Key to the indo-australian genera of Kyphosidae.

I. Jaws with an outer series of obtusely lanceolate incisors, implanted by horizontal basal process, behind them a band of villiform teeth; fine teeth on vomer, palatines and tongue. Squamation complete, wanting only before eyes, thickly covering soft vertical fins; maxillary exposed. . . . . . *Kyphosus*. p. 222.

II. Jaws with outer series of tricuspid incisors, behind them some series of smaller tricuspid ones, the last almost setaceous, palate toothless. Squamation incomplete on head; irregular and of different size, small on base of soft vertical fins; maxillary concealed by wide preorbital. . . . . *Proteracanthus*. p. 230.

1. **Kyphosus** Lacépède.

(*Kyphosus* Lacépède, Hist. nat. Poiss. III, 1802, p. 114).
Pimelepterus Lacépède, Hist. nat. Poiss. IV, 1803, p. 429.
type: *Pimelepterus bosci* Lac.

Elongate-ovate, elliptical, moderately compressed, completely covered with rather small, thick ctenoid scales, wanting only before eyes, forming a thick coat on soft vertical fins and on base of paired fins; lateral line complete, arched. Head short, snout blunt, eye large situated in anterior half or middle of head, slightly above horizontal through gape of mouth. Nostrils close together, the posterior a slit close to eye, the anterior a small, round opening. Mouth small, protractile, more or less horizontal, maxillary exposed, no supramaxillary; seven branchiostegals; gillmembranes not united with isthmus; preoperculum usually denticulate. Jaws with an outer series of obtusely lanceolate, narrow incisors implanted by a horizontal posterior basal process, behind them a band of slender teeth, fine teeth on vomer, palatines and tongue. Dorsal continuous, its rounded soft part shorter or longer than spinous part and higher than at least the last dorsal spines, which count XI and are depressible in a scaly groove; anal with III spines; caudal forked; pectorals short, rounded; ventrals somewhat behind their base, with a spine and five rays.

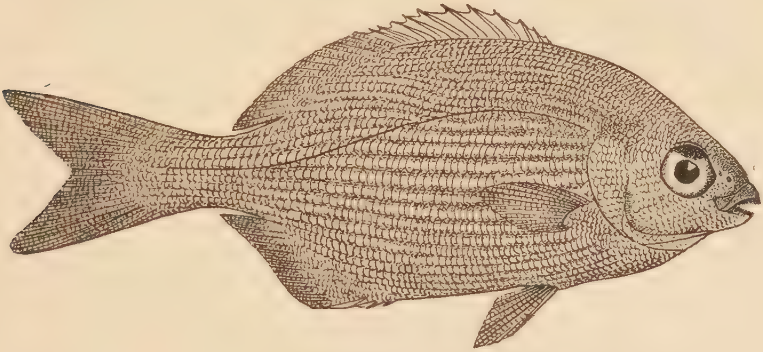

Fig. 58. *Kyphosus waigiensis* (A. G.) × 5/9.

Distribution: Marine littoral fishes of medium size and herbivorous diet, feeding on algae, frequenting coral reefs and rocky shores, in tropical and subtropical seas. Valued as food.

Key to the indo-australian species of Kyphosus.

1. Base oft soft dorsal much shorter than that of spinous dorsal; 12 dorsal rays, much higher than highest middle spines . . . . *K. cinerascens* p. 224.
2. Base of soft dorsal nearly equal to or longer than that of spinous dorsal; 14—15 dorsal rays.
   - *a.* Dorsal rays as high as or slightly higher than highest middle spines. Eye 3.5—4 in head, in its anterior half. Lateral line 53—55 . . . . . . *K. lembus* p. 226.

b. Dorsal rays as high as or slightly lower than highest middle spines. Eye about twice in head, posterior border of pupil in middle of head. Lateral line 65—70 . . . . *K. waigiensis* p. 227.

1. **Kyphosus cinerascens** (Forsk.)

Sciaena cinerascens Forskål. Descr. Anim. 1775, p. 53.
Pimelepterus indicus Cuvier & Valenciennes, Hist. nat. Poiss. VII, 1831, p. 270.
Pimelepterus altipinnis Cuvier & Valenciennes, ibidem.
Pimelepterus dussumieri Cuvier & Valenciennes, l.c. p. 273.
Pimelepterus Raynaldi Cuvier & Valenciennes, l.c. p. 274.
Pimelepterus tahmel Rüppel, Neue Wirbelth. Fische 1840, p. 35.
Pimelepterus indicus Bleeker, Journ. Ind. Arch. III (1848) 1849, p. 66. — Nat. Tijdschr. Ned. Indië II, 1851, p. 212.
Pimelepterus altipinnis Bleeker, Nat. Tijdschr. Ned. Indië III, 1852, p. 727.
Pimelepterus Dussumieri Bleeker, Verh. Batav. Gen. XXV, 1853, p. 40.
Pimelepterus tahmel Günther, Cat. Brit. Mus. I, 1859, p. 499.
Pimelepterus tahmel Bleeker, Acta Soc. Sc. Indo-Neerl. VIII, 1860, p. 29.
Pimelepterus indicus Bleeker, ibidem.
Opisthistius tahmel Gill, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 245.
Pimelepterus tahmel Playfair, Fish. Zanzibar 1866, p. 46.
Pimelopterus (sic) *tahmel* Klunzinger, Verh. Zool. Bot. Ges. Wien XX, 1870, p. 795 (p.p.).
Pimelepterus cinerascens Day, Proc. Zool. Soc. London 1870, p. 684.
Pimelepterus cinerascens Bleeker, Verh. Akad. Amsterdam XVIII (1876) 1877, Rév. Chétodont, p. 12. — Atl. ichth. IX, 1877, p. 15.
Pachymetopon squamosum Alleyne & Macleay, Proc. Linn. Soc. N. S. Wales 1877, p. 275.
Pimelepterus cinerascens Day, Fish. India 4° 1878—1888, p. 143.
Pimelepterus indicus Klunzinger, Sitzb. Akad. Wien 1880, p. 357.
Pimelepterus indicus Steindachner & Döderlein, Denkschr. Akad. Wien XLVIII, 1883, p. 21.
Pimelepterus cinerascens Klunzinger, Fische Roth. Meer 1884, p. 64.
Pimelepterus indicus Macleay, Proc. Linn. Soc. N.S. Wales 1884, p. 15.
Pimelepterus cinerascens Day, Fish. Brit. India II, 1889, p. 48.
Pimelepterus tahmel Sauvage, Poiss. Madagascar 1891, p. 516.
Pimelepterus cinerascens Thurston, Madras Gov. Mus. Bull. III, 1895, p. 135.
Pimelepterus cinerascens Steindachner, Abh. Senckenberg. Nat. Ges. XXV, 1901, p. 421.
Kyphosus cinerascens Seale, Occ. Papers Bishop Mus. IV, 1906, p. 47.
Kyphosus cinerascens Jordan & Richardson, Bull. Bur. Fish. 1908, p. 260.
Kyphosus cinerascens Jordan & Thompson, Proc. U. S. Nat. Mus. XII, 1912, p. 596.
Kyphosus cinerascens Kendall & Radcliffe, Mem. Mus. Comp. Zoology, Harvard Coll. XXXV, 1912, p. 120.
Kyphosus cinerascens M. Weber. Siboga-Exp. Fische, 1913, p. 194.
Kyphosus cinerascens Ogilby, Mem. Queensl. Mus. II, 1913, p. 90.
Kyphosus cinerascens Jordan, Tanaka & Snyder, Journ. Coll. Sc. Tokyo, XXXIII, 1913, p. 176.

Kyphosus cinerascens de Beaufort, Bijdr. Dierk. 1913, p. 111.
Kyphosus cinerascens Mc Culloch, Rec. Austral. Mus. XI, 1917, p. 181.
Kyphosus cinerascens Jordan & Stark, Ann. Carnegie Mus. XI, 1917, p. 452.
Kyphosus cinerascens Mc. Culloch, Rec. Austral. Mus. XIII, 1920, p. 59.
Kyphosus cinerascens Herre & Montalban, Philippine Journ. Sci. 1927, p. 436.
Kyphosus cinerascens Fowler, Fish. Oceania Bishop Mus. X, 1928, p. 221.
Pimelepterus cinerascens Duncker & Mohr, Mitt. Zool. Mus. Hamburg, XLIV, 1929, p. 66.
Pimelepterus cinerascens Pillay, Journ. Bombay Nat. Hist. Soc. XXXIII, 1929, p. 364.
Kyphosus cinerascens Whitley, Proc. Linn. Soc. N.S. Wales LIV, 1929, p. 92.
Kyphosus cinerascens Herre, Journ. Pan-Pacific Res. Institut VI, 1931, pp. 7 & 10.
Kyphosus cinerascens Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 211.
Pimelepterus cinerascens Borodin, Bull. Vanderbilt Mar. Mus. I, 1932, p. 84.

D. XI, 12; A. III, 12; L.r. 63—65; L.tr. $\frac{\frac{9}{1}}{18\text{—}19}$.

Elongate-ovate, dorsal and posterior ventral profile evenly convex, height 2.2—2.5 in length, head 3.8—3.9, about as high as long, rostro-dorsal profile strongly convex with a pronounced swelling above nostrils; interorbital space flatly convex, somewhat more or less than 2.5 in head, more than snout, which goes 2.8—3.2 in head. Eye 3.2 to 3.6 in head, situated in its anterior half. Preorbital with the lower border horizontal, nearly entire in adult and without scales. Gape of mouth rather small, horizontal; maxillary reaching vertically to frontborder of eye. Operculum with a blunt spine; the minute serration of the preoperculum in adult reduced to the rounded angel. Jaws with a single row of compressed, at their top rounded incisors; their crown about twice shorter than the horizontally deflected root, minute teeth on vomer, palatines and tongue. Spinous dorsal about two spines longer than soft which is much higher than highest middle spines; in the soft dorsal the first ray in young and adult slightly more than half length of head, the fifth still somewhat more, while the highest spine: the third, is much less than that length; anal with rounded anterior angel, more than twice higher than rather stout spines, of which the third is much the longest. Pectorals 1.3 to 1.5 in head, nearly as long as head without snout 1). Ventrals slightly shorter. Caudal very broad, not deeply and angularly emarginate, the lobe pointed, least height of its peduncle about half length of head. Olivaceous gray to blackish,

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1) It must be a misprint when Bleeker calls them "capitis parte postoculari non ad paulo brevioribus", also refuted by his figure.

ventrally lighter, centers of scales, especially the lateral ones, brown to whitish, forming longitudinal light bands alternating with darker ones; fins grayish; a subocular silvery band running to snout. Length up to 385 mm.

Habitat: Banka; Sumatra; Java; Island Babi!; Cocos Isl.; Bali; Flores; Timor; Solor; Rotti!; Celebes (Makassar, Tombariri); Sula Besi!; Sangir Isls; Salibabu Isl.!; Ternate; Obi major; Ambon; Saparua; New Guinea. — Red Sea, Zanzibar, Bourbon, Mauritius, Madagascar, British India, Ceylon, Andamans, Philippines, Japan, Australia (King George Sound, Great Barrier Reef, Port Moresby), Darnley Isl., Melanesian Isls., Sandwich Isl., Easter Isl.

2. **Kyphosus lembus** (C.V.)

Pimelepterus lembus Cuvier & Valenciennes, Hist. Nat. Poissons VII, 1831, p. 201.
?*Pimelepterus oblongior* Cantor, Cat. Malayan Fish, 1850 p. 1156 (p.p.).
Pimelepterus lembus Bleeker, Nat. Tijdschr. Ned. Indië IV 1853 p. 469.
Pimelepterus ternatensis Bleeker, loc. cit. p. 604.
Pimelepterus lembus Bleeker, Nat. Tijdschr. Ned. Indië XII 1856—57, p. 233.
Pimelepterus lembus Günther, Cat. Brit. Mus. I, 1859, p. 498.
Pimelepterus ternatensis Günther, loc. cit. p. 499.
Pimelepterus lembus Playfair in Playfair & Günther, Fish. Zanzibar 1866, p. 46.
Pimelepterus lembus Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877. Rev. Chétodont. p. 14. — Atl. ichth. IX, 1877, p. 15.
Pimelepterus lembus Karoli, Termeszetrajzi füzetek V, 1882, p. 11.
Pimelepterus lembus Sauvage, Poiss. Madagascar 1891, p. 516.
Kyphosus lembus Fowler, Journ. Acad. Nat. Sci. Philadelphia (2) XII, 1904, p. 530.
Kyphosus lembus Jordan & Seale, Bull. Bur. Fisheries XXV, (1905) 1906, p. 271.
Kyphosus lembus Jordan & Thompson, Proc. U. S. Nat. Mus. XLI, 1912, p. 595.
Kyphosus lembus Jordan, Tanaka & Snyder, Journ. Coll. Sci. Tokyo, XXXIII, 1913, p. 176.
Kyphosus lembus Herre & Montalban, Philippine Journ. Sci. XXXIII, 1927, p. 437.
Kyphosus lembus Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 221.
Kyphosus lembus Herre, Journ. Pan-Pacific Res. Instit. VI, 1931, pp. 7, 12.
?*Kyphosus vaigiensis* Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 209.

D. X, 14; A. III, 12—13; L.l. 55 or less; L.tr. $\frac{\frac{11}{1}}{16}$.

Dorsal and ventral outline about evenly arched, height 2.2—2.4 in length, head 3.5—3.6, slightly longer than high, rostro-dorsal profile strongly convex. Eye 3.5—4 in head situated in anterior half of head, its diameter slightly shorter than snout; interorbital space convex, much broader than eye. Preorbital naked, its lower border nearly entire; maxillary reaching front border of eye; gape of mouth rather small, horizontal; lower border of preoperculum serrate in young, operculum with a blunt point. Jaws with a single row of narrow, somewhat pointed incisors; minute teeth on vomer, palatines and tongue. Spinous dorsal about one third shorter than soft, fourth and fifth spine highest, but slightly lower than highest anterior portion of soft dorsal, the fourth and fifth rays of which are the highest, the posterior gradually diminishing in height. The anal anteriorly of similar height and about twice higher than third spine which is the longest; posterior rays gradually diminishing in size, their border somewhat concave. Pectorals slightly shorter than head without snout, ventrals somewhat shorter. Caudal emarginate, lobes acute; least height of caudal peduncle more than twice in head. Uniform gray, darker above, sides with alternating darker and

Uniform gray, darker above, sides with alternating darker and

lighter longitudinal bands, the latter corresponding with the centers of the row of scales; fins grayish. Length up to 360 mm.

Habitat: Singapore; Pinang; Batu Isls; Pulu Weh!; Sumatra; Java; Celebes (Makassar!, Menado); Ternate; Batjan; Ambon; New-Guinea (Wilhelmland!) — Zanzibar, Madagascar; Malay Peninsula; Southern Japan to Tokyo, Philippines, New Hebrides, Solomons; Marcus Isld; Hawaii.

3. **Kyphosus vaigiensis** (Q. G.) (Fig. 58).

Pimelepterus vaigiensis Quoy & Gaimard, Voy „Uranie" Zool. 1824, p. 386, Pl. 62, fig. 4.

? *Pimelepterus oblongior* Cuvier & Valenciennes, Hist. Nat. Poiss. VII, 1831, p. 264.

Pimelepterus marciae Cuvier & Valenciennes, loc. cit. p. 267.

Pimelepterus marciae, Rüppell, Neue Wirbelth. Fische 1835, p. 35.

Pimelepterus marciae Bleeker, Journ. Ind. Arch. III (1848) 1849, p. 10. — Nat. Tijdschr. Ned. Indie II, 1851, p. 312.

Pimelepterus marciae Rüppell, Samml. Senckenb. Mus. 1852, p. 10.

Pimelepterus waigiensis Günther, Cat. Brit. Mus. I, 1859, p. 498.

? *Pimelepterus oblongior* Bleeker, Versl. Akad. Amsterdam XII, 1861, p. 72 (after Cantor).

Pimelepterus waigiensis Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 283.

Pimelepterus waigiensis Günther, Fische Südsee, 1873—75, p. 68.

? *Pimelepterus oblongior* Bleeker, Verh. Akad. Amsterdam XVII, (1876) 1877, Rév. Chétodont. p. 15. — Atl. ichth. IX, 1877, p. 16.

Pimelepterus waigiensis Bleeker, Verh. Akad. Amsterdam XVII (1876) 1877, Rév. Chétodont. p. 17. — Atl. ichth. IX, 1877, p. 17. — Arch. Néerl. Sc. Nat. XIII, 1878, p. 44.

Pimelepterus waigiensis Macleay, Proc. Linn. Soc. N.S. Wales VIII, 1883, p. 264.
Pimelepterus waigiensis Klunzinger, Fische Roth. Meer. 1884, p. 65.
Pimelepterus fuscus Day, Fish. India 4° 1878—88, p. 143. (= waigiensis in Supplement 1888). — Fish. Brit. India II, 1889, p. 48.
Pimelepterus vaigiensis Duncker, Mitt. Nat. Mus. Hamburg XXI, 1904, p. 151.
Kyphosus waigiensis Jordan & Seale, Bull. Bur. Fish. XXV (1905) 1906, p. 271.
Kyphosus oblongior M. Weber, Siboga-Exp. Fische 1913, p. 194.
Kyphosus vaigiensis Fowler, Fish Oceania, Bishop Mus. X, 1928, p. 222.
Pimelepterus vagiensis (sic) Pillay, Journ. Bombay Nat. Hist. Soc. XXXIII, 1929, p. 364.
Kyphosus waigiensis Herre, Journ. Pan-Pacific Res. Inst. VII, 1932, p. 4.
Kyphosus oblongior Fowler, Bull. U.S. Nat. Mus. XII, 1933, p. 205.
? *Kyphosus bleekeri* Fowler, Bull. U.S. Nat. Mus. XII, 1933, p. 211.

D. X-XI, 14-15; A. III, 12-13; L. l. ca. 65-70; L. tr. $\begin{array}{c}11\\\hline 1\\\hline 18\end{array}$.

Oblong-oval, dorsal and ventral profile about evenly arched, height 2.3-2.5 in length, head 3.5-3.7, short, about as long as high; rostrodorsal profile convex, somewhat swollen before interorbital space, which is slightly convex and somewhat broader than diameter of eye, which goes thrice in length of head; the hindborder of pupil is situated in middle of length of head. Preorbital entire, naked, at least in young 1). Preopercle with the lower border finely crenulated. Snout shorter than eye, maxillary reaching below frontborder of eye. Horizontal root of teeth in jaws, according to age, less than twice length of vertical part; fine teeth on vomer, palatines, pterygoids and tongue. Spinous dorsal somewhat shorter than or about equally long as soft, which is of about uniform height and slightly lower than highest middle spines; soft anal with a slightly concave border in its posterior half, the highest anterior rays about twice as high as the third longest spine. Pectorals nearly 1.5 in length of head, shorter than ventrals. Caudal with shallow emargination, least height of its peduncle about equal to postocular part of head. Margaritaceous to whitish below, back grayish to brown; sides with longitudinal stripes corresponding to longitudinal rows of scales; a silvery or grayish band along lower edge of eye to snout; fins violaceous. Length up to 410 mm.

Habitat: Singapore; Pinang; Java; Celebes (Makassar!); Sa-

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1) The figure of Quoy & Gaimard shows it naked, that of Bleeker scaled, in his text he calls it „ex parte squamato", while he calls that of the small *P. oblongior* „alepidoto".

libabu Isl.!; Ternate; Ambon; Waigeu; New Guinea!; — Red Sea, British India, Philippines, Palau, Melanesian Isl., Samoa, Tahiti.

Note. *Pimelepterus oblongior* C.V. is a dubious species, both to its habitat and insufficient original description, which was founded on a specimen of 168 mm. length in the Leiden Museum from unknown habitat. Günther rightly relegated its name therefore to his „note of insufficiently described species" and cited only Cantor as author, who used the name in his Catalogue of malayan fishes for specimens from the Sea of Pinang, which, as already Bleeker supposed, were probably a mixture of two species. Notwithstanding Bleeker revived in 1861 that name in a list of Fishes from Pianang, surely after Cantor. In 1877 (Verh. Akad. Amsterdam p. 15 and Atl. ichth. IX, p. 15) he gave a complete diagnosis after the Leiden specimen described by Cuvier and called it *oblongior*. As a specimen, caught by the Siboga-Expedition, agreed with Bleeker's description, it was enlisted under that name. Revising the indo-australian Kyphosidae we are now more inclined to taxe it as a young specimen of *P. vaigiensis* Q.G. Already Bleeker in the lastnamed publications called it „fort voisine du *P. waigiensis* mais le dernier parait bien distinct ayant la tête plus longue que haute, la partie basale des dents aux deux mâchoires plus longues, les préorbitaires portant des écailles, la dorsale épineuse plus courte que la partie molle, les rangées des écailles un peu plus nombreuses et un rayon de plus tant à la dorsale qu'à l'anale". He came to this conclusion by comparing his young *oblongior* of 168 mm. with a *vaigiensis* of 410 mm. length and finishes it with the remark, that it must be shown, that the differences are of specific value and not of growth. This last supposition is indeed probable for the differences in length of head, length of basal part of teeth, presence of scales on the usually naked preorbital, while the accurate counting of the individually variable number of scales is difficult and easily leading astray.

Regarding the squamation of the preorbital of *vaigiensis* Dr Koumans was so kind to inform us that it is in the specimen of Bleeker not so densely scaled as in his figure, though it is possible that some scales may be lost. Other specimens in the Leiden Museum show also scales on the preorbital, but a large specimen more so than smaller ones. A specimen of 190 mm from Philippines has only a few scales on the preorbital of one side, the other without.

Proteracanthus Günther.

(Günther, Cat. Brit. Mus. I, 1859, p. 426).

Type: *Crenidens sarissophorus* Cantor, Cat. Malay. Fishes. Journ. Asiat. Soc. Bengal XVIII, 1850, p. 1034.

Elongate-oval, compressed, covered with ctenoid scales of different size and irregularly arranged, continued on base of soft vertical fins, lateral line arched. Eye high up in anterior half of head. Two nostrils, the posterior an oval nearly vertical slit immediately before eye, the anterior small, oval at some distance lower down. Mouth terminal, its horizontal gape small, not protractile; upper jaw prominent, maxillary concealed under large preorbital bone, no supramaxillary. Preopercle inferiorly denticulate, opercle with two distant flat spines. Gillmembranes broadly united to densely scaly isthmus; six branchiostegals, no pseudobranchiae. Jaws with flat tricuspid curved incisors, widening towards the cusps and increasing in size towards angle of mouth; the outer series the largest, behind them some series of smaller ones; the last almost setaceous; palate toothless. Single dorsal with a procumbent spine, its spinous part in a low scaly sheath, much longer than rayed part, X, 15-16; anal with III strong spines and 15-16 rays of similar construction as soft dorsal; caudal with 15 bran-

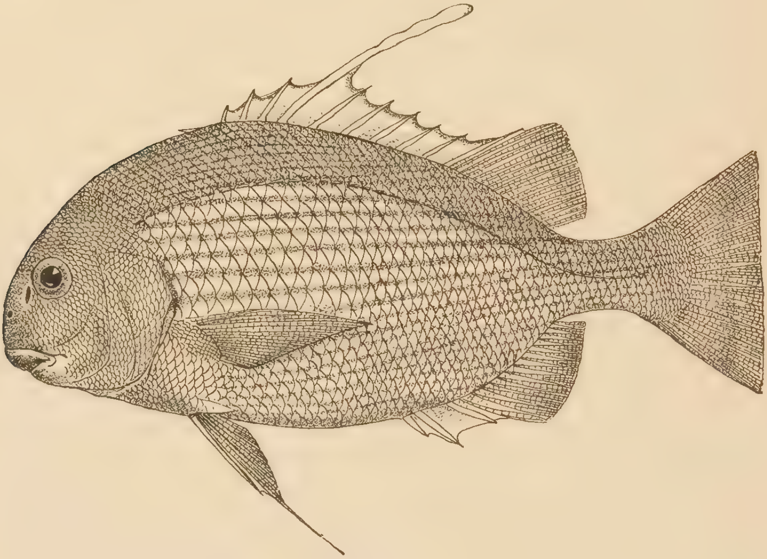

Fig. 59. *Proteracanthus sarissophorus* (Cant.) × 2/5.

ched rays. Pectorals acute; below their base the acute ventrals with strong spine, five rays and a scaly axillary process.

Distribution that of the single species known.

1. **Proteracanthus sarissophorus** (Cantor). (Fig. 59).

Crenidens sarissophorus Cantor, Cat. Malay. Fishes. Journ. Asiatic Soc. Bengal XVIII (1849) 1850, p. 1034.
Girella sarissophorus Bleeker, Nat. Tijdschr. Ned. Indië III (1851) 1852, p. 64.
Proteracanthus sarissophorus Günther, Cat. Brit. Mus. I, 1859, p. 427.
Proteracanthus sarissophorus Bleeker, Verh. Akad. Amsterdam XVIII, (1876) 1877, Révis. Chétodont. p. 18. — Atl. ichth. IX, 1877, p. 17.
Proteracanthus sarissophorus Karoli, Termeszitrajzi füzetek V, 1882, p. 11.
Proteracanthus sarissophorus Volz, Zool. Jahrb. Syst. XIX, 1903, p. 354.
Proteracanthus sarissophorus Duncker, Mitth. Naturh. Mus. Hamburg XXI, 1904, p. 150.
Proteracanthus sarissophorus Vinciguerra, Ann. Mus. Civ. Genova (3) X (L), 1926, p. 573.
Crenidens spec. Hardenberg, Treubia XIII, 1931, p. 129.
Proteracanthus sarissophorus Hardenberg, Treubia XIII, 1931, p. 129. — Treubia XIV, 1934, p. 309.
Crenidens spec. Hardenberg, Treubia XIV, 1934, p. 309.
Proteracanthus sarissophorus Chevey, Inventaire faune ichth. Indochine 19e note, 1932, p. 23.
Proteracanthus sarissophorus Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 200.

D. X, 15; A. III, 14—15. L.l. about 50; L.tr. $\frac{\frac{7}{1}}{24\text{—}26}$.

Oblong-oval, dorsal profile from snout to tail convex, much more arched than ventral; height about $2^{1}/_{4}$, head about 4 in length. Eye 3.75 in head, situated high up, in its anterior half far distant above horizontal through gape of mouth; interorbital space convex. Scales irregularly arranged and of different size, on head, above lateral line, along abdomen and on base of vertical fins much smaller than those on sides of body. Spinous dorsal much lower than the rounded soft part, except the fourth spine which is much elongate, thickened and irregularly swollen; a procumbent spine precedes the following ten 1) the last of which is longer than the preceding closely attached to the first dorsal ray and about $^{3}/_{4}$ of that ray. Second anal spine much longer than first and third, the rounded soft anal conform soft dorsal; its first rays about as long as the dorsal ones; the ultimate slightly shorter.

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1) In the above cited diagnoses of 1876 and 1877 Bleeker gives, by misprint, the number of dorsal spines as 16.

Caudal almost truncated. The triangular pectorals shorter than head, the ventrals still shorter with a strong spine, nearly half length of head, first ray as long as or longer than pectorals. For other characters see those of genus. Greenish brown on head and back, ligther on flanks, silvery on abdomen, the scales broadly dark edged, the trunk with longitudinal darks bands between the series of scales; fins brownish. Length up to 325 mm.

Nomen indig. Rintsior, (Serawak).

Habitat: Singapore; Sumatra (Banjuasin, Bagan Si Api Api, Rokan River!, Deli!); Borneo (Serawak). Pinang. — Malacca (Kuala Lumpur), In sea and brackish water.

Note: By the kindness of Dr Hardenberg we had the benefit to see one of the specimens of 54 mm length named in his list as *Crenidens* spec. We are of opinion that it is a juvenile stage of *Proteracanthus sarissophorus* (Cant.).

25. Family LUTJANIDAE

Oblong or elongate, more or less compressed; covered with moderate or small ctenoid scales, which sometimes loose their ciliation in old specimens. Scales extending on head. Snout, preorbital and postorbital generally naked. Soft part of dorsal, anal and caudal scaly or not. Lateral line complete, almost straight or gently curved. Head pointed or conical. Eyes large or moderate. Two nostrils on each side. Mouth more or less protractile, large, moderate or small.

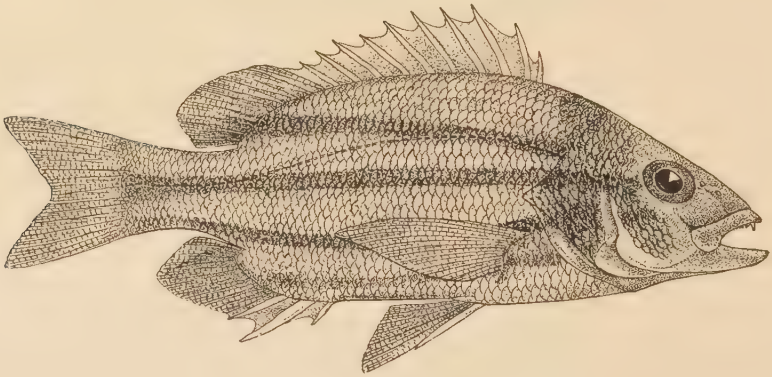

Fig. 60. *Lutjanus maxweberi* Popta. (Type) × 5/7.

Maxillary broadest in its posterior part, not overlapped externally by the extremity of the premaxilla, slipping, at least partly, under the preorbital and postorbital. Hindborder of preoperculum denticulate or smooth. Gillmembranes free from isthmus. Five to seven branchiostegals. Pseudobranchiae present. Generally a few rows of small teeth in the jaws, seldom deciduous or wanting in the upper jaw, often with an external row of enlarged ones and canines in front of both jaws or in the upper jaw only. Sometimes the lateral teeth in the jaws are round, flat molars. Small teeth on vomer and palatines present or absent. Subocular shelf strong, or small, seldom wanting. Dorsal beginning at a short distance behind head, with IX—XV spines and 9 to 20 soft rays. Anal with III spines and 7—14 soft rays. Caudal with 17 principal rays. Pectorals generally long, acute. Ventrals originating somewhat behind pectorals, with a spine and five branched rays. Axillary process present. Vertebrae 24 (10 + 14), but in the Pomadasynae 26—27 (10—11 + 16—17).

Distribution. All temperate and warm seas.

Key to the Indo-australian subfamilies of Lutjanidae.

I. Preoperculum with three or more transverse rows of scales. Palate toothed or edentulous.
  a. Vomer and palatines often with teeth. If palate toothless either the dorsal is deeply notched, appearing as two separate fins, or A. III. 11—14, or the lower jaw has a symphysial knob and D. IX. 9—10, or the teeth in the jaws are minute or deciduous. D. IX—XIII. 9—17. Subocular shelf strong. Outer face of palatines without distinct ridge . . . . 1. *Lutjaninae* p. 233.
  b. Palate always toothless. Dorsal and anal spines rather weak. Preorbital naked. D. X. 9—16. A. III. 7—11. Subocular shelf present, sometimes small. Outer face of palatines with a strong ridge from the base of the maxillary process to the pterygoid . . . . 2. *Nemipterinae p.* 324.
  c. Palate always toothless. Dorsal and anal spines robust. Preorbital scaly. D. IX—XV. 12—20. A. III. 7 (8). No subocular shelf. Outer face of palatines with a ridge along their posterior edge . . . . 3. *Pomadasynae* p. 396.
II. Preoperculum without scales. Palate always toothless. Often molar teeth in sides of jaws . . . . 4. *Lethrininae* p. 429.

1. Subfam. LUTJANINAE

Body oblong or elongate, more or less compressed, covered with moderate or small ctenoid scales. Head in a greater or lesser extent covered with scales. Preorbital generally naked, preoperculum always scaly. Mouth terminal, more or less protractile, rather large or small. Maxillary broadest distally, slipping under the preorbital and suborbital for at least the greater part of the length of its upper edge. Gillmembranes free from isthmus. A strong subocular shelf. Outer face of palatine flattish or concave, without distinct ridge. Five to seven branchiostegals. Preoperculum denticulate or entide. Teeth in the jaws generally in several rows, often with an outer row of enlarged ones, with or without canines. Sometimes teeth minute and deciduous or wanting in the upper jaw. Teeth on vomer and palatines present or absent. A single dorsal, continuous or deeply notched, seldom devided into two fins, consisting of IX—XIII spines and 9 to 17 soft rays. Anal with III spines and 7—14 soft rays. Vertical fins covered by scales or scaleless. Caudal truncate or more or less deeply forked. Pectorals generally long and pointed. Ventrals with a spine and 5 branched rays, inserted behind pectorals.

Distribution: Tropical and subtropical seas.

Key to the Indo-australian genera of Lutjaninae.

A. Dorsal not deeply notched.
  I. Dorsal and anal fins more or less scaly.
    a. Mouth large, protractile. Teeth on vomer and palatines well developed. Preoperculum with a more or less distinct notch, to fit a knob of the interoperculum. D. X—XII. Caudal truncate or somewhat emarginate . . 1. *Lutjanus* p. 235.
    b. Mouth moderate or small, somewhat protractile. Teeth on vomer and palatines present or absent. Preoperculum entire, without serrations. Caudal deeply forked.
      1. Scales on body in oblique series. D. XI. . . . . 2. *Pinjalo* p. 292.
      2. Scales on body in horizontal series. D. X—XIII. . . . . .3. *Caesio* p. 294.
  II. Dorsal and anal scaleless, but with a very low scaly sheath. Lower jaw with a symphysical knob. D. IX. Preoperculum denticulate . . . . 4. *Symphysanodon* p. 308.
  III. Dorsal and anal scaleless, without scaly sheath. Preoperculum entire or feebly serrate.

1. Teeth on vomer and palatines. D. X. . 5. *Aprion* p. 310.
2. Palate toothless.
    - *a.* Teeth in lower jaw only. D. IX. Ll. 80—83 . . . . 6. *Gymnocaesio p.* 315.
    - *b.* Teeth in jaws minute or deciduous. D. X. Ll. 68—73. . . . . 7. *Apharcus* p. 317.

B. Dorsal deeply notched, appearing as two separate fins. Dorsal and anal scaleless. Palate edentulous. . . . . 8. *Microlabrichthys* p. 321.

1. **Lutjanus** Bloch.

(Bloch, Naturg. Ausländ. Fische IV, 1790, p. 108)

Diacope Cuvier, Mem. Mus. Hist. Nat. Paris I, 1815, p. 360. ·
Mesoprion Cuvier & Valenciennes, Hist. Nat. Poissons II, 1828, p. 441.
Genyoroge Cantor, Journ. Asiat. Soc. Bengal XVIII, 1850, p. 994.
Neomaenis Girard, Rep. U. S. Mex. Bound. Surv. Zool. X, 1859, p. 18.
Macolor Bleeker, Act. Soc. Sc. Indo-Neerl. VIII, 1860. Dertiende Bijdr. Vischfauna Celebes, p. 25.
Hypoplites, Evoplites, Proamblys Gill, Proc. Acad. Nat. Sc. Philadelphia 1862, p. 236.
Benettia, Parkia, Fowler, Journ. Acad. Nat. Sc. Philadelphia (2) XII, 1904, p. 524 and p. 525.
Rhomboplitoides Fowler, Proc. Acad. Nat. Sc. Philadelphia 1918, p. 33.
Glabrilutjanus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 88, p. 95.
Loxolutjanus Fowler, ibid. p. 90, p. 165.

Body oblong or somewhat elongate, rather compressed, covered with moderate ctenoid scales, arranged in horizontal rows or those above the lateral line and sometimes also below it, oblique. Lateral line continous, gently curved. Head generally pointed. Snout, preorbital, suborbitals and jaws generally naked. Preoperculum, interoperculum, suboperculum and operculum scaly. Scales on upperside of head beginning either between posterior part of eyes or further back, in last case the temporal region immediately behind eye is naked. Mouth rather large, protractile. Small teeth in the jaws in several rows or narrow bands, with an outer series of distant caninoid ones, some of which in front part of the jaws may be larger and fang-like. Small teeth on vomar in a Λ shaped patch, in a triangular patch with or without posterior prolongation or in a diamond-shaped patch. Palatines with narrow bands of small teeth. Tongue sometimes provided with minute teeth, specially in old specimens. Preoperculum serrate, its hindborder with a shallow or deep notch to fit a more or less developed knob of the interoperculum. Dorsal continuous, with X—XI, seldom with XII spines and 11 to 16 soft rays. Anal with III spines and 8—11 soft rays. Soft dorsal and anal scaly basally. Caudal truncate or emarginate. Pectorals long and pointed. Ventrals not much shorter than pectorals, with a spine and five branched rays. An axillary process present.

Distribution: Littoral voracious fishes of all subtropical and tropical seas. Some species entering fresh water.

Key to the Indo-australian species of Lutjanus

A. Profile of head straight or convex. Pectorals not longer than head. Anal generally with 7—9, selden with 10—11 rays.
  I. Longitudinal rows of scales above lateral line parallel to it or ascending somewhat below posterior part of soft dorsal only.
    1. Fourth to seventh dorsal rays prolonged into long filaments. Body with white longitudinal bands . . 1. *L. nematophorus* p. 240.
    2. Dorsal rays without filaments.
      a. Scales on head beginning behind eye. Temporal region naked.
        *a*¹. Maxillary reaching to below middle of eye. 6—7 transverse rows of scales on preoperculum. 7 rows of scales between lateral line and median dorsal spines. A dark patch in lateral line . . . . 2. *L. fuscescens* p. 241.
        *b*¹. Maxillary reaching to below frontborder of pupil. 5 transverse rows of scales on preoperculum. 6 rows of scales between lateral line and median dorsal spines. A dark patch in lateral line. . . . . 3. *L. ehrenbergi* p. 242.
        *c*¹. Maxillary reaching to below frontborder of eye. 6. transverse rows of scales on preoperculum. No dark patch in lateral line. Body with dark longitudinal bands . . . . . . 4. *L. maxweberi* p. 243.
      b. Scales on head beginning above middle of eye. Temporal region scaly. 7 transverse rows of scales on preoperculum . . . . 5. *L. johni* p. 244.
  II. Longitudinal rows of scales above lateral line parallel to it in their anterior part only, ascending to dorsal profile below posterior part of spinous dorsal. Scales on head beginning behind eye. Anterior part of soft anal and the ventrals dark . . . . 6. *L. argentimaculatus* p. 246.

III. Longitudinal rows of scales above lateral line obliquely ascending to dorsal profile, those in front of and below anterior part of spinous dorsal sometimes parallel to lateral line.

1. Scales on head beginning above middle of eye or nearly so. Temporal region scaly.

a. Vomerine teeth in a $\triangle$ or a $\underset{|}{\triangle}$. Preopercular notch slightly developed.

a^1. Ten dorsal spines, exceptionally 9 or 11.

a^2. 9½—11 scales between lateral line and median dorsal spines. Axil of pectoral black . . . . 7. *L. chrysotaenia* p. 248.

b^2. 6—7 scales between lateral line and median dorsal spines. A dark band from hindborder of eye to caudal . . . . 8. *L. vitta* p. 250.

c^2. 6 scales between lateral line and median dorsal spines. Preorbital and suborbital rugose . . . . 9. *L. lutjanus* p. 251.

b^1. Eleven dorsal spines. 5 rows of scales between lateral line and median dorsal spines.

a^2. Height 2.9—3.2. Lower preopercular limb scaly . . 10. *L. lineolatus* p. 253.

b^2. Height 3.5—3.8. Lower preopercular limb naked. A dark band from snout to caudal. Two pearly spots above lateral line, one below spinous the other below soft dorsal . . . . 11. *L. biguttatus* p. 255.

b. Vomerine teeth in a $\wedge$. Preopercular notch deep. Often a dark blotch below origin of spinous dorsal, for the greater part above lateral line. Ten or eleven dorsal spines.

a^1. Longitudinal light blue bands, bordered above and below by a dark line[1]) . . . . 12. *L. kasmira* p. 256.

b^2. No light bands, or, if present, not bordered by dark lines.

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1) In specimens preserved in formaline these bands are often darkbrown.

Often a narrow dark band along base of dorsal . . 13. *L. rufolineatus* p. 259.

2. Scales on head beginning behind eye. Temporal region naked or nearly so.

   a. Longitudinal rows of scales below lateral line ascending, those on lower part of sides sometimes parallel to axis of body.

      a^1. A. III. 10—11. D. XI. 15—16. Soft dorsal and anal pointed. Three broad transverse bands on head and body . . . . . 14. *L. sebae* p. 261.

      b^1. A. III. 8 (9). No dark transverse bands or a band on head only.

         a^2. D. X. 13—15. Soft dorsal rounded. Preopercular notch very deep and narrow. Posterior part of caudal peduncle and base of caudal darkbrown in young. 15. *L. gibbus* p. 263.

         b^2. D. XI. 14. Soft dorsal rounded. Preopercular notch almost absent. A black saddle, bordered by margaritaceous, especially anteriorly, on caudal peduncle. 9—10 scales between lateral line and median dorsal spines . . . . . 16. *L. sanguineus* p. 265.

         c^2. D. XI. 14—15 (XII. 13—14). Soft dorsal pointed. Preopercular notch shallow. A margaritaceous saddle-like patch on caudal peduncle, immediately behind dorsal. 7—8 scales between lateral line and median dorsal spines. Dorsal and caudal with a narrow dark marginal border 17. *L. malabaricus* p. 268.

         d^2. D. XII. 13. Soft dorsal rounded. Preopercular notch shallow. Five dark longitudinal bands on body. 18. *L. dodecacanthoides* p. 269.

   b. All the longitudinal rows of scales below lateral line parallel to axis of body.

      a^1. Vomerine teeth in a triangular patch, with a posterior

prolongation or in a diamond-shaped patch.
- a^2. A large black blotch in lateral line below last spines and anterior rays of dorsal.
  - a^3. Greater part of blotch below lateral line. D. X. 13—14. . . . . . . 19. *L. fulviflamma* p. 270.
  - b^3. Greater part of blotch above lateral line. D. X. 14—15. Striped when young . . . . 20. *L. russelli* p. 272.
- b^2. No black blotch . . . . . 21. *L. rangus* p. 274.

b^1. Vomerine teeth in a triangular patch without posterior prolongation or in a $\wedge$.
- a^2. Body with 8 broad transverse bands. Caudal peduncle with a large black blotch. . . . . 22. *L. semicinctus* p. 275.
- b^2. No bands. Two large margaritaceous blotches on back. . . . . 23. *L. bohar* p. 276.
- c^2. Caudal with a semilunar dark vertical band . . . . 24. *L. lunulatus* p. 278.
- d^2 Caudal more or less totally dark. Dorsal with a dark border.
  - a^3. 6½—7 scales between lateral line and median dorsal spines. Preopercular notch well developed, at least in adults. 6 transverse rows of scales on preoperculum. . . . . 25. *L. vaigiensis p. 279.*
  - b^3. 7—7½ scales between lateral line and median dorsal spines. Preopercular notch indistinct. 7—8 rows of scales on preoperculum . . . . 26. *L. janthinuropterus* p. 281.
- e^2. Two longitudinal bands, one through eye to caudal, the other below it. . . . 27. *L. lemniscatus* p. 283.
- f^2. A large black blotch on sides.
  - a^3. D. X. 13 6—6½ scales between lateral line and median dorsal spines. 28. *L. monostigma* p. 284.

b^3. D. X. 14—15 7 scales between lateral line and median dorsal spines. Striped when young. . 20. *L. russelli* p. 272.

g^2. A large black blotch on caudal peduncle. Longitudinal and transverse dark bands . . . . 29. *L. decussatus* p. 285.

h^2. A chalk-white blotch in lateral line, above anterior part of soft dorsal, preceded by a darkbrown blotch. A transverse darkbrown band from origin of dorsal to that of pectorals. Each scale of body with a pearly spot . . . . 30. *L. rivulatus* p. 287.

B. Profile of head strongly convex. Pectorals longer than head. Anal with 11 rays . . . 31. *L. niger* p. 289.

1. **Lutjanus nematophorus** (Blkr.)

Mesoprion nematophorus Bleeker, Act. Soc. Scient. Indo-Neerl. VIII, 1860, Dertiende Bijdr. vischfauna Celebes, p. 56.

Lutjanus nematophorus Bleeker, Verh Kon. Akad. Amsterdam XIII, 1873. Révision Lutjanus, p. 12. Atl. Ichth. VIII, 1876—1877, p. 47.

Lutjanus nematophorus Ogilby, Mem. Queensland Museum VII, Prt. 1, 1920, p. 20.

Lutjanus nematophorus Fowler, Bull. U. S. Nat. Museum Vol. XI, 1931, p. 95.

Lutianus nematophorus Herre, Notes on Fishes Zool. Mus. Stanford Univ. I, 1934, p. 49.

D. X. 15. A. III. 9. P. 2.14. V. 1.5. Ll. 55. Ltr. $\begin{array}{c}7\\ \hline 1\\ \hline 21-22\end{array}$.

Height 2.6, equal to length of head, 3.5 in length with caudal. Eye 3.6, 1.3 in snout. Interorbital space flat, 1.4 in eye. Mouth oblique, maxillary reaching to below anterior half of eye. Teeth in narrow bands in the jaws, with an outer series of enlarged ones, four of which in the anterior part of the upper jaw are large canines. Small teeth on vomer in a ∧ shaped patch, on palatines in narrow bands. Anterior part of head naked. Scales beginning on occiput behind eye. Temporal region naked. Preoperculum with about 7 transverse rows of scales. Posterior and inferior preopercular limb naked. Hindborder of preoperculum denticulate. No preopercular notch. Longitudinal rows of scales above lateral line parallel to it, parallel to axis of body below lateral line. About 52 transverse rows of scales above and 46 rows below lateral line.

First dorsal spine more than half length of second, which is shorter than third. Third to fifth spines subequal, as long as snout. Soft dorsal higher than spinous part, the fourth to seventh rays prolonged into a long filament (broken in the type-specimen). Third anal spine longer, but not stronger than second, not much shorter than longest dorsal spine. Pectorals as long as eye and snout together, ventrals one third of eye shorter. Caudal broken in type-specimen, apparently truncate. Colour of preserved specimen brown, with six chalky white longitudinal bands, the first of which along base of dorsal, the fourth from hindmargin of eye to upper part of caudal, second and third between these two and parallel to them; fifth from below eye to middle of caudal, sixth from axil of pectoral to lower part of base of caudal. Fourth and sixth band broader than the others. Fins light brownish. (Description made after a typical specimen of Bleeker's collection in the Leiden Museum). Length 305 mm.

Habitat: Singapore; Celebes (Badjoa, Lagusi). — Philippines, Australia (Queensland). In sea.

Note. Fowler says that there are no teeth on the palate, one of the reasons why he created the new subgenus *Glabrilutjanus* for this species. We find however teeth in the small typical specimen, in the same way as described by Bleeker. Possibly they disappear with age.

2. **Lutjanus fuscescens** (C.V.)

Mesoprion fuscescens Cuvier & Valenciennnes, Hist. Nat. Poissons VI, 1830, p. 538.
Mesoprion hoteen Richardson, Rep. Ichthol. China, Rep. 15th meeting British Assoc. London 1846, p. 229.
Mesoprion fuscescens Bleeker, Nat. Tijdschr. Ned. Indië IX, 1855, p. 197.
Mesoprion fuscescens Günther, Cat. Brit. Mus. I, 1859, p. 201.
Lutjanus fuscescens Bleeker, Versl. Kon. Akad. Amsterdam XIV, 1862, p. 106. Verh. Kon. Akad. Amsterdam XIII, 1873. Révision Lutjanus, p. 15. Atl. Ichth. VIII, 1876—1877, p. 48.
Lutjanus fuscescens Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 94.

D. X. 13-14. A. III. 8. P. 2. 15. V. 1.5. Ll. 47. Ltr. $\begin{array}{c}7\\ \hline 1\\ \hline 18\end{array}$.

Height 2.4, 3.1 in length with caudal. Head 2.5, 3 in length with caudal. Eye 4.4, 1.5 in snout. Interorbital space 1.3 in eye. Maxillary reaching to below middle of eye. Teeth in a few rows in jaws, the outer ones partly canines or caninoid. Small teeth on vomer in a triangular patch and on palatines in a narrow band. Anterior part of head naked. Scales beginning on occiput above hindmargin of eye with a series of large scales, behind these about 12—14 smaller scales to origin of dorsal. Preoperculum with 6—7 transverse rows of scales, its limb scaleless, its hind- and inferior border rather strongly denticulated. Preopercular notch shallow. The longitudinal rows of scales above lateral line parallel to it, those below parallel to axis of body. First dorsal spine little more than half length of second. Third, fourth and fifth spines longest, equal to snout. Last dorsal spine slightly less than penultimate one. Soft dorsal rounded, higher than spinous part. First anal spine about half as long as second, which is longer than third and as long as longest dorsal spines. Soft anal rounded, its longest rays longer than anal spines. Pectorals as long as head without snout. Ventrals about as long as pectorals. Ventral spine as long as third anal spine. Caudal truncate or slightly emarginate. Colour of preserved specimens brownish. Scales of body with a dark stripe. A large dark patch, partly in lateral line, below middle of soft dorsal. Upper part of finmembrane of spinous dorsal dark. Soft dorsal with a median darkish band, which is not always distinct. Soft anal darkish in its anterior part. Caudal darkish. Length 280 mm.

Habitat: Borneo; Celebes (Menado); Batjan; Ceram; Timor! — China, Philippines. In rivers.

3. **Lutjanus ehrenbergi** (Peters)

Mesoprion Ehrenbergi Peters, Monatsber. Akad. Berlin, 1869, p. 704.
Diacope Ehrenbergi Klunzinger, Verh. zool. bot. Ges. Wien XX, 1870, p. 701.
Lutjanus oligolepis Bleeker, Verh. Akad. Amsterdam XIII, (1872), 1873, Révision Lutjanus p. 17. Atl. Ichth. VIII, 1876—1877, p. 48.
Mesoprion Ehrenbergi Klunzinger, Fische des rothen Meeres I, 1884, p. 13.

D. X. 13. A. III. 8. P. 2.14. V. 1.5. Ll. 48. Ltr. $\begin{array}{c}6\\ \overline{1}\\ \hline 16\end{array}$.

Height 2.7, 3.3 in length with caudal. Head 2.6, 3.2 in length with caudal. Eye 4, 1.1 in snout and about equal to interorbital space. Maxillary reaching to below frontborder of pupil. Teeth in the outer row in jaws large, pointed, the foremost in the upper jaw still larger and canine-like. Teeth on vomer small, in a band forming a ∧. On palatines a narrow band of similar small teeth. Anterior part of head naked. Scales beginning on occiput. About 13 rows of scales to origin of dorsal. Preoperculum with 5 transverse rows of scales, its hind- and lower border rather strongly denticulated. Preopercular notch very shallow. The longitudinal rows of scales above lateral line parallel to it, those below the lateral line running parallel to the axis of the body. About 50 transverse rows of scales above, and 45 rows below lateral line. Soft parts of vertical fins with a scaly sheath. First dorsal spine half length of second, which is somewhat less than third. Fourth spine longest, equal to postorbital part of head. Following spines gently decreasing in length, the last one however slightly longer than the penultimate. Soft dorsal rounded, higher than, or as high as, spinous part. First anal spine less than half length of second, which is longer than third and about equal to postorbital part of head. Soft anal rounded, its rays longer than anal spines. Pectorals longer than, ventrals about as long as head without snout. Caudal truncate. Colour of preserved specimens brownish above, light below, each scale below lateral line with a silvery spot, forming longitudinal silvery stripes. A large oval darkbrown blotch, for the greater part above lateral line, below end of spinous dorsal. Fins light yellowish or brownish. Length 228 mm.

Habitat: Pulu Weh!; Sumatra (Padang!); Simalur!; Nias!; Java (Batavia); Borneo (Balikpapan!); Celebes (Makassar); Sula Islands!; Ternate; Ambon!. — East coast of Africa, Sokotra, Red Sea, Formosa!, New Ireland, New Britain, Solomon Islands. In sea.

4. **Lutjanus maxweberi** Popta (Fig. 60)

Lutjanus max weberi Popta, Zool. Meded. Rijksmuseum Nat. Hist. Leiden VI, 1921, p. 203.
Lutjanus Palmeri Fowler, Bull. U. S. Nat. Museum Vol. XI, 1931, p. 94.

D. X. 13 (14). A. III. 8 (9). P. 2.14. V. 1.5. Ll. 50. Ltr. $\begin{array}{c}5\frac{1}{2}\\1\\\hline 14\end{array}$.

Height 2.5, 3.2 in length with caudal. Head 2.6, 3.3 in length with caudal. Eye 4.2, 1.6 in snout and equal to convex interorbital space. Mouth somewhat oblique, maxillary reaching to below frontborder of eye. Teeth in very narrow bands in the jaws, which an outer series of enlarged ones, some of which in front of upper jaw are canines. Small teeth on vomer in a triangular patch, on palatines in an elongate patch. Scales beginning on occiput behind head. Temporal region naked. Preoperculum with 6 transverse rows of scales. Lower part of posterior, and inferior preopercular limb naked. Hindborder of preoperculum finely denticulated. Preopercular notch very shallow. Longitudinal rows of scales above lateral line parallel to it, those below lateral line parallel to longitudinal axis of body. About 50 transverse rows of scales above, and 47 below lateral line. First dorsal spine half length of second, which is shorter than third. Third, fourth and fifth dorsal spines longest, equal to postorbital part of head. Soft dorsal rounded, its longest ray equal to longest dorsal spine. First anal spine minute, second much longer than third and equal to postorbital part of head. Soft anal rounded, longest rays longer than spines. Pectorals one third of snout shorter than head. Ventrals slightly longer than eye and snout together. Caudal emarginate. Colour of preserved specimen light brownish. Four darkbrown longitudinal bands, the first from head to middle of base of soft dorsal, the second from hindborder of eye to middle of base of caudal, the third from lower border of eye through axil of pectoral to lower part of base of caudal, the fourth from base of pectoral to soft anal. Anterior part of soft anal darkbrown. Length 140 mm. (Description made after the type in the Senckenberg-Museum, Frankfurt a.M., seen by us).

Habitat: River La on Island Muna! — Philippines. In freshwater.

5. **Lutjanus johni** (Bl.)

Anthias johni Bloch, Ausländ. Fische VI, 1792, p. 113.
Sparus tranquibaricus Shaw, Zool. IV, 1803, p. 471.
Coius calus Hamilton Buchanan, Fishes Ganges 1822, p. 90.
Mesoprion unimaculatus Quoy & Gaimard, Zoologie Voyage Uranie & Physicienne, 1824, p. 304.
Mesoprion unimaculatus Cuvier & Valenciennes, Hist. Nat. Poissons II 1828, p. 441.
? *Mesoprion yapilli* Cuvier & Valenciennes, ibid., p. 483.
Serranus pavoninus Cuvier & Valenciennes, ibid VII, 1831, p. 443.
? *Mesoprion yapilli* Richardson, Ann. Mag. Nat. Hist. IX, 1842, p. 26.
Diacope xanthozona (v. Hasselt) Bleeker, Nat. Geneesk. Arch. Ned. Indië II (3), 1845, p. 526.
Mesoprion unimaculatus ? Bleeker, Verh. Bat. Gen. XXII, 1849. Percoiden, p. 42.
Mesoprion Johni Cantor, Journ. Asiatic Soc. Bengal XVIII, 1850, p. 995.
Mesoprion johni Günther, Cat. Brit. Mus. I, 1859, p. 200.
Mesoprion Johni Kner, Novara Exp. Fische, 1865—1867, p. 35.
Mesoprion unimaculatus Jouan, Mem. Soc. Sci. nat. Cherbourg XII 1866, p. 117.
? *Mesoprion johnii* Günther, Fische der Südsee I, 1873—1875, p. 15.
Mesoprion johnii Day, Fishes of India 1875—1888, p. 42.
? *Mesoprion yapilli* Day, ibid. p. 45.
Lutjanus Johnii Bleeker, Verh. Akad. Amsterdam XIII (1872) 1873. Révision Lutjanus, p. 20. Atl. Ichth. VIII 1876—1877, p. 49.
Mesoprion Johnii Macleay, Descr. Cat. Australian Fish I 1881, p. 29.
Lutjanus (Benettia) johnii, Fowler, Journ. Acad. Nat. Science Philadelphia (2) XII, 1904, p. 525.
Lutjanus johnii Evermann & Seale, Bull. Bureau Fish. XXVI, 1906, p. 79.
Lutjanus johnii Chaudhuri, Mem. Ind. Museum V, 1923, p. 718.

Lutjanus johni Hora, Mem. Asiat. Soc. Bengal VI, 1924, p. 487.
Lutianus johni Barnard, Ann. S. Afric. Mus. XXI, 1925—1927, p. 661.
Lutjanus johnii Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 90.
Lutjanus johnii Chevey, Invent. faune ichth. Indochine 1932, p. 21.

D. X. 13—14. A. III. 8. P. 2.14—15. V. 1.5. Ll. 48—50. Ltr. $\begin{array}{c} 5\frac{1}{2}-6 \\ \hline 1 \\ \hline 15-16 \end{array}$.

Height 2.4—2.8, 3.1—3.5 in length with caudal. Head 2.5—2.7, 3.2—3.3 in length with caudal. Eye 4.7—4.8, 1.7—1.8 in snout. Interorbital space somewhat less than eye. Maxillary reaching slightly farther back than vertical through frontborder of eye. Narrow bands of small teeth in jaws, with an outer row of caninoid ones, some of which in the upper jaw are still larger and moderate canines. Teeth on vomer small, in band forming a Λ or almost in a triangular patch. Narrow bands of small teeth on palatines. Anterior part of head naked. Scales beginning above middle or posterior part of eye, the temporal region scaly. Preoperculum with 7 transverse rows of scales, its limb scaleless, its hind- and lower border rather strongly denticulated, less so in large specimens. Preopercular notch very shallow. The longitudinal rows of scales above lateral line parallel to it, those below parallel to axis of body. About 48—50 transverse rows of scales above and about 45 below lateral line. Soft parts of vertical fins with a scaly sheath. First dorsal spine about half length of second, which is two thirds of third spine. Third spine slightly less than fourth and fifth spines, which are longest and equal to postorbital part of head. The following spines gently decrease in length. Soft dorsal rounded, the longest rays slightly less than longest spines. First anal spine less than half length of second, which is longer and stronger than third and equal to postorbital part of head. Soft anal rounded, higher than spinous part. Pectorals longer, ventrals shorter than head without snout. Ventral spine as long as snout. Caudal truncate. Colour of preserved specimens brownish above, silvery below, each scale of body with a brown spot, forming longitudinal dark bands. A large oval black blotch, for the greater part above lateral line, below end of spinous dorsal. In young specimens it is surrounded by a silvery ring, forming an ocellus. In some preserved specimens this black blotch is wanting. Membrane between soft rays darkish above scaly sheath, other fins light brown or yellowish. Length 913 mm.

Nomen indig.: Djenahah (Malay). Tambangan, Petehan, Tjabe-watu (Javanese). Ketamba (Balikpapan).

Habitat: Singapore; Sumatra (Padang, Priaman, Siboga); Simalur!; Nias; Bintang; Banka; Duizend Islands!; Java (Batavia!; Bantam, Tjilatjap!, Surabaya, Pasuruan, Tegal, Semarang); Madura; Bali; Borneo (Sampit, Stagen!, Balikpapan!); Celebes (Makassar!); Buka buka Island, Gulf of Tomini; Flores; Timor; Ambon; Waigeu; New Guinea. — From the coast of Natal, Madagascar, coast of British India to Malay Peninsula, China, Philippines, Queensland, Pacific Islands to Tahiti. In sea and brackish water.

6. **Lutjanus argentimaculatus** (Forsk.)

Sciaena argentimaculata Forskål, Descr. Animalium 1775, p. 47.
Sciaena argentata Linné, Gmelin, Syst. Nat. Ed. 13a 1788, p. 1300.
Perca argentata Bloch Schneider, Systema Ichthyol. 1801, p. 86.
Alphestes gembra Bloch Schneider, ibid. p. 236 (errore).
Alphestes sambra Bloch Schneider, ibid. Tab. 51.
Labrus argentatus Lacépède, Hist. Nat. Poissons III, 1802, p. 426, 467.
Diacope argentimaculata Cuvier & Valenciennes, Hist. Nat. Poissons II, 1828, p. 432.
Mesoprion gembra Cuvier & Valenciennes, ibid. p. 474.
? *Diacope rosea* Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 537.
Mesoprion taeniops Cuvier & Valenciennes, ibid. p. 543.
Mesoprion immaculatus ? Bleeker, Verh. Bat. Gen. XXII, 1849, Percoiden p. 45. (nec. C.V.).
? *Mesoprion rangus* Cantor, Journ. Asiat. Soc. Bengal XVIII, 1850, p. 996 (nec. C.V.).
Mesoprion gembra Cantor, ibid. p. 997.
Mesoprion gembra ? Bleeker, Nat. Tijdsch. Ned. Indië V, 1853, p. 246.
Mesoprion gembra Günther, Cat. Brit. Mus. I, 1859, p. 193.
Mesoprion rangus Kner, Novara Exp. Fische I, 1865, p. 34 (nec. C.V.).
Mesoprion sambra Peters, Monatsber. Akad. Berlin 1865, p. 111.
Mesoprion sambra (gembra) Steindachner, Sitzber. Akad. Wien Math. Naturw. Cl. LVI, 1867, p. 307.
Diacope argentimaculata Klunzinger, Verh. zool. bot. Ges. Wien XX, 1870, p. 699.
Mesoprion garretti Günther, Fische der Südsee I, 1873—1875, p. 15.
Lutjanus argentimaculatus Day, Fishes of India 1875—1888, p. 37.
Lutjanus roseus Day, ibid. p. 38.
Lutjanus argentimaculatus Bleeker, Verh. Akad. Amsterdam XIII (1872) 1873, Révision Lutjanus, p. 84. Atl. Ichth. VIII, 1876—1877, p. 75.
Mesoprion argentimaculatus Klunzinger, Sitzber. Akad. Wien 1880, p. 341.
Mesoprion argentimaculatus Macleay, Proc. Linn. Soc. New S. Wales IX, 1884, p. 6.
Mesoprion argentimaculatus Klunzinger, Fische des rothen Meeres I, 1884, p. 14.
? *Lutjanus gembra* Sauvage, Poissons de Madagascar 1891, p. 87.
Lutjanus argentimaculatus Steindachner, Abh. Senckenb. naturf. Ges. XXV, 1901, p. 414.

Lutianus argentimaculatus Jordan & Evermann, Proc. U. S. Nat. Mus. XXV, 1902, p. 344.
Lutianus argentimaculatus Jordan & Seale, Bull. Bureau Fish. XXV, (1905) 1906, p. 262.
Lutianus argentimaculatus Jordan & Richardson, ibid. XXVI, (1907) 1908, p. 257.
Lutianus salmonoides Gilchrist & Thompson, Ann. S. Afric. Mus. VI, 1908, p. 146.
Lutianus argentimaculatus Snyder, Proc. U. S. Nat. Mus. XLII, 1912, p. 499.
Lutjanus argentimaculatus M. Weber, Siboga Exp. Fische 1913, p. 252.
Lutjanus argentimaculatus Pellegrin, Bull. Soc. Zool. France XXXIX, 1914, p. 225.
Lutianus gembra Barnard, Ann. S. Afric. Museum XXI, 1925—1927, p. 661.
Lutianus argentimaculatus Fowler, Bull. U. S. Nat. Museum Vol. XI, 1931, p. 97.
? *Lutjanus argentimaculatus* Chevey, Travaux Inst. Océanogr. Indo Chine 4e Mem. 1932, p. 76.

D. X. 14. A. III. 8. P. 2. 14—15. V. 1.5. Ll. 45—48. Ltr. $\begin{array}{c}6-6\frac{1}{2}\\ \hline 1\\ \hline 17-19\end{array}$.

Height 2.5—2.7, 3.1—3.3 in length with caudal. Head 2.5—2.6, 3—3.2 in length with caudal. Eye 4.2—5.1, 1.4—1.8 in snout and equal to or somewhat more than somewhat convex interorbital space. Mouth somewhat oblique, maxillary reaching to below frontborder of pupil. Small teeth in narrow bands in the jaws, with an outer series of enlarged ones, a few of which in the anterior part of the upper jaw are canines. Small teeth in a ∧ shaped band or in a triangular patch with a posterior prolongation or in a diamond-shaped patch, on the vomer. On palatines an elongate patch of similar teeth. Scales beginning on occiput with a distinct temporal band. Preoperculum with 7—8 transverse rows of scales; posterior and inferior preopercular limb naked. Posterior and inferior border of preoperculum denticulated. Preopercular notch distinct, but shallow. Longitudinal rows of scales above lateral line parallel to it in the anterior part, ascending to dorsal profile below posterior part of spinous dorsal, parallel to axis of body below lateral line. About 47—53 transverse rows of scales above, and 38—44 below lateral line. Dorsal spines slender. First spine less than half length of second, which is shorter than third. Third and fourth spines longest, nearly equal to postorbital part of head. Soft dorsal rounded, higher or lower than spinous part. First anal spine less than half length of second, which is equal to or somewhat longer than third one, equal to snout in young specimens, shorter than snout in large specimens. Anal rounded. Soft anal rays much higher than spines. Pectorals about one half of snout shorter than head. Ventrals as long as eye and snout together, ventral spine equal to snout. Caudal slightly emarginate. Colour of preserved specimens reddish brown, more or less silvery below. Scales of sides in some specimens dark with a silvery centre, in others silvery with a dark border. In specimens up to 130 mm 8 to 11 transverse silvery bands on the body and a sinous brown line below eye, disappering with age. Spinous dorsal and distal part of soft dorsal reddish brown. Soft dorsal sometimes with three longitudinal rows of dark spots. Anterior part of soft anal and ventrals, excepting the spine and the first ray violet. Caudal reddish brown or lighter, with or without a white submarginal vertical band. Pectorals hyaline. Length 915 mm.

Nomen indig.: Djambian, Djenahah (Malay, Batavia), Somassi (Menado, Obi), Laubidi, Laubini, Lawabini (Batjan).

Habitat: Singapore; Sumatra (Benkulen, Padang, Priaman); Simalur!; Pulu Babi!; Nias!; Biliton; Java (Batavia!); Borneo (Pontianak, Si Amil Island, Tawao, Sandakan); Celebes Makassar!, Amparang river near Balangnipa!); Saleyer!; Bali; Flores!; Sumbawa!; Timor; Sula Islands!; Batjan; Halmahera!; Obi!; Buru!; Ceram!; Ambon!; Haruku; Saparua!; Aru Islands!; Waigeu; Rawak; New Guinea (North- and South coast). — East coast of Africa from Natal, Madagascar, Zanzibar, Red Sea, coast of British India, China, Riu Kiu Islands, Formosa, Philippines, North Australia, New Britain, Kingsmill Islands, Pomotu archipelago. In sea, estuaries and rivers.

7. **Lutjanus chrysotaenia** (Blkr.)

Mesoprion chrysotaenia Bleeker, Nat. Tijdsch. Ned. Indië II, 1851, p. 170. Act. Soc. Scient. Indo-Neerl. I, 1856, Beschr. visschen Manado, p. 40.
Mesoprion chrysotaenia Günther, Cat. Brit. Mus. I, 1859, p. 192.
Lutjanus chrysotaenia Bleeker, Ned. Tijdsch. Dierkunde I, 1863, p. 233.
Mesoprion chrysotaenia Kner, Novara Exp. Fische I, 1865, p. 34.
Lutjanus chrysotaenia Bleeker, Verh. Akad. Amsterdam XIII, (1872) 1873, Révision Lutjanus, p. 22.
Lutjanus chrysotaenia Day, Fishes of India 1875—1888, p. 36.
Lutjanus chrysotaenia Bleeker, Atl. Ichth. VIII, 1876—1877, p. 50.
Lutjanus chrysotaenia Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 141.

D. X. 14(15)—15(16). A. III. 9(10). P. 2. 13—14. V. I. 5.

Ll. 67—72. Ltr. $\begin{array}{c} 9\frac{1}{2}-11 \\ \hline 1 \\ \hline 22-24 \end{array}$.

Height 2.5—2.9, 2.9—3.5 in length with caudal. Head 2.5—2.6, 2.9—3.3 in length with caudal. Eye 4.5—4.9, 1.1—1.3 in somewhat convex interorbital space and 1.6—1.7 in snout. Mouth slightly oblique. Maxillary reaching to below middle of eye or nearly so. Narrow bands of small teeth in the jaws, with an outer series of distant canines or caninoids, two of which in the anterior part of the upper jaw are fang-like. A triangular or an arrow-shaped patch of small teeth on the vomer. Narrow bands of similar teeth on the palatines. Anterior part of head naked. Scales beginning above middle of eyes. Temporal region scaly. About 9 to 10 transverse rows of scales on preoperculum, the limb of which is scaleless. Hind- and lower-border of preoperculum rather strongly denticulated in half grown specimens, merely rough in old ones. Preopercular notch shallow. Longitudinal rows of scales running obliquely and ascending to dorsal profile above the lateral line, parallel to the axis of the body below it. About 75—80 transverse rows of scales above and about 65—70 below lateral line. First dorsal spine somewhat less than half length of second, which is shorter than third. Fourth spine longest, equal to snout. Following spines decreasing gradually in length to the last. Soft dorsal rounded, the longest rays somewhat longer than longest dorsal spines. First anal spine equal to or less than half length of second. Third spine longest, about at equal distance between posterior nostril and hind-margin of eye. Anal rounded, its longest rays about equal to those of dorsal. Pectorals slightly longer than head without snout. Ventrals equal to postorbital part of head and half eye together. Ventral spine equal to or slightly shorter than snout. Caudal slightly emarginate. Colour of preserved specimens greenish gray above, silvery below, with about seven darker longitudinal bands, more conspicuous on the back and upper part of sides than lower down. The interspaces between these bands more or less silvery, especially that running just above axil of pectoral to middle of base of caudal, which forms a more or less distinct silvery band. In old specimens these markings fade. Axil of pectorals dark brown. Fins yellowish or brownish. Length 357 mm.

Habitat: Singapore; Sumatra (Telokbetong); Nias; Bintang; Banka; Biliton; Java (Batavia!) Bali; Borneo (Balikpapan!, Sandakan); Celebes (Makassar!); Buton; Flores!; Rotti!; Timor; Ternate; Batjan; Obi major; Buru; Ambon; Banda!; New Guinea. — Madras, Nicobars, Siam, China, Philippines, Thursday Island!, Queensland, Western Australia, Solomon Islands. In sea.

8. **Lutjanus vitta** (Q.G.)

Serranus vitta Quoy & Gaimard, Zool. Voyage de l'Uranie et de la Physicienne, 1824, p. 315.
Serranus vitta Cuvier & Valenciennes, Hist. Nat. Poissons II, 1828, p. 239. ibid. VI, 1830, p. 505.
Serranus vitta Richardson, Rep. ichth. China, Rep. 15th meeting Brit. Ass. 1845, p. 234.
Mesoprion enneacanthus Bleeker, Verh. Bat. Gen. XXIII, 1849, Perc. p. 40.
Mesoprion phaiotaeniatus Bleeker, ibid. p. 43.
Mesoprion vitta Bleeker, ibid. p. 44.
Diacope vitta Temminck & Schlegel, Fauna japonica, Poissons 1850, p. 13.
Mesoprion phaiotaenia Bleeker, Nat. Tijdsch. Ned. Indië III, 1852, p. 444.
Mesoprion vitta Günther, Cat. Brit. Mus. I, 1859, p. 207.
Mesoprion Ophuysenii Bleeker, Act. Soc. Sci. Indo neerl. VIII. 1860, Achtste bijdr. Vischf. Sumatra, p. 74.
Lutjanus vitta Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 233.
Mesoprion enneacanthus Kner, Novara Exp. Fische 1865, p. 33.
Mesoprion vitta Kner, ibid. p. 37.
Mesoprion vitta Playfair, Fishes of Zanzibar, 1866, p. 18.
Lutjanus vitta Bleeker, Verh. Akad. Amsterdam XIII (1872) 1873, Révision Lutjanus p. 25.
Lutjanus vitta Day, Fishes of India, 1875—1888, p. 46.
Lutjanus vitta Bleeker, Atl. Ichth. VIII, 1876—1877, p. 51.
Mesoprion vitta Macleay, Proc. Linn. Soc. New S. Wales VII, 1882, p. 232.
Lutjanus vitta Steindachner & Döderlein, Denkschr. Akad. Wien XLVII, 1883, p. 236.
Mesoprion vitta Nyström, Bihang till K. Sv. Vet. Akad. Handl. XIII, Afd. IV no. 4, 1887, p. 7.
Mesoprion enneacanthus Perugia, Ann. Mus. Civ. Genova (2) VII, 1889, p. 271.
Lutianus vitta Rutter, Proc. Acad. Nat. Sci. Philadelphia 1897, p. 74.
Lutianus vitta Jordan & Seale, Proc. Dav. Acad. Sci. X, (1905) 1907, p. 10.
Lutianus vitta Jordan & Seale, Bull. Bur. Fish. XXVI, (1906) 1907, p. 20.
Lutianus vitta Seale & Bean, Proc. U. S. Nat. Mus. XXXIII, 1908, p. 243.
Lutianus vitta Seale, Philip. Journ. Science V, 1910, p. 275.
Lutianus vitta Jordan & Thompson, Proc. U. S. Nat. Mus. XXXIX, 1911, p. 448.
Lutianus vitta Jordan, Tanaka & Snyder Journ. Coll. Science Univ. Tokyo XXXIII, 1913, p. 164.
Lutianus vitta Jordan & Starks, Ann. Carnegie Mus. XI, 1917, p. 449.
Lutjanus vitta Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, p. 30.
Lutjanus vitta Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 138.

D. X. 13 (by exception IX. 13 or XI. 12). A. III. 7—8. P. 2.14. V. I. 5. Ll. 50—51. Ltr. $\frac{6\text{—}7}{\frac{1}{18}}$.

Height 2.6—3, 3.4—3.6 in length with caudal. Head 2.5—2.7, 3.2—3.4 in length with caudal. Eye 4.2—4.4, 1.4—1.6 in snout and somewhat more than slightly convex interorbital space. Mouth slightly oblique. Maxillary reaching to below anterior half of eye. Narrow bands of small teeth in the jaws, with an outer series of distant caninoids or canines, two of which in the anterior part of the upper jaw are fang-like. Small teeth in a triangular patch on head of vomer, with or without a posterior prolongation. Anterior part of head naked. Scales beginning above middle of eye. Temporal region scaly. About 7 or 8 transverse rows of scales on preoperculum. Preopercular limb scaleless in its posterior part. Hind- and lower border of preoperculum rather strongly denticulated in half-grown specimens, merely rough in old ones. Preopercular notch shallow. Longitudinal rows of scales running obliquely and ascending to dorsal profile above the lateral line, parallel to the axis of the body below it. About 65 transverse rows of scales above lateral line and about 60 rows below it. First dorsal spine somewhat less than half length of second. Third spine longest, equal to postorbital part of head. Following spines decreasing gradually in length to the last. Soft dorsal slightly rounded, less high than spinous dorsal. First anal spine half length of second, which is as long as third or a little longer and equal to distance between hindmargin of eye and posterior nostril. Anal somewhat rounded, its longest rays longer than anal spines. Pectorals equal to distance between hindborder of operculum and posterior nostril. Ventrals as long as postorbital part of head and half eye, ventral spine equal to snout. Caudal slightly emarginate. Colour of preserved specimens brown above, silvery below. Narrow dark lines, following the longitudinal rows of scales and therefore oblique above the lateral line and horizontal below it. A rather broad dark grey longitudinal band from middle of hindborder of eye to base of caudal, where it ends just above lateral line. Fins yellowish. Length over 260 mm.

Nomen indig.: Tanda-tanda; Djambiam (Malay).

Habitat: Singapore; Sumatra (Benkulen, Padang, Tiku, Priaman); Nias!; Banka; Biliton; Java (Batavia!); Bali; Borneo (Kota Baru!, Sandakan); Celebes (Makassar, Bulukomba); Saleyer!; Ternate; Ambon; Ceram; Waigeu; Rawak; Aru Islands; New Guinea. — Seychelles, coast of British India, Tonkin, China, Japan, Formosa, Philippines, Louisades, New Caledonia, North Australia.

In sea.

9. **Lutjanus lutjanus** Bl.

Lutjanus lutjanus Bloch, Ausländ. Fische IV, 1790, p. 107.
Lutjanus Blochii Lacépède, Hist. Nat. Poissons IV, 1803, p. 178, 210.

Mesoprion madras Cuvier & Valenciennes, Hist. Nat. Poissons II, 1828, p. 479.
Mesoprion olivaceus Cuvier & Valenciennes, ibid. p. 478.
Mesoprion lutjanus Cuvier & Valenciennes, ibid. p. 479.
Diacope olivaceus Bleeker, Nat. & Geneesk. Arch. Ned. Indië II (3), 1845, p. 526.
Mesoprion olivaceus Bleeker, Verh. Bat. Gen. XXII 1849. Perc. p. 44.
Mesoprion lutjanus Kner, Novara Exp. Fische. I, 1865, p. 37.
Mesoprion machas Playfair, Proc. Zool. Soc. London 1867, p. 849.
Lutjanus olivaceus Bleeker, Verh. Akad. Amsterdam (2) II (1867) 1868, p. 296.
Lutjanus madras Day, Fishes of India, 1875—1888, p. 47.
Lutjanus lutjanus Bleeker, Verh. Akad. Amsterdam XIII (1872) 1873. Révision Lutjanus p. 27. — Atl. Ichth. VIII, 1876—1877, p. 52.
Lutjanus madras Sauvage, Poissons de Madagascar 1891, p. 89.
Lutianus lunulatus Evermann & Seale, Bull. Bur. Fish. XXVI, 1906 (1907), p. 80 (nec M. Park).
Lutianus madras Jordan & Starks, Ann. Carnegie Mus. XI, 1917, p. 449.
Lutjanus lutjanus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 147.

D. X. 13—14. A. III. 8. P. 2.14. V. I. 5. Ll. 48—52. Ltr. $\frac{\frac{6}{1}}{14-15}$.

Height 2.7—3, 3.4—3.6 in length with caudal. Head 2.8—2.9, 3.5 in length with caudal. Eye 3.6—3.8, 1.2 in snout and equal to or somewhat more than somewhat convex interorbital space. Mouth slightly oblique. Maxillary reaching to below middle of eye or nearly so. Very narrow bands of small teeth in the jaws, with an outer series of larger caninoid ones, those in front of the upper jaw and on the sides of the lower jaw still larger and more or less fang-like. Small teeth on vomer, forming a triangular patch with a long pointed backward prolongation. Similar teeth on palatines in a narrow band. Preorbital and suborbital rugose. About six transverse rows of scales on preoperculum, not counting those of the preopercular limb, which are more or less deciduous. Posterior preopercular limb naked. Hind- and lower border of preoperculum denticulated, less so in large specimens. Preopercular notch slightly developed. Anterior part of head naked. Scales beginning above middle of eyes. Temporal region scaly. Longitudinal rows of scales above lateral line running obliquely and ascending to dorsal profile, those below lateral line parallel to the axis of the body, somewhat ascending on the tail. About 56—62 transverse rows of scales above, and about 48—49 below lateral line. First dorsal spine half length of second, which is shorter than third. Third and fourth longest, about equal to postorbital part of head. Following spines gradually decreasing in length. Soft dorsal slightly rounded, lower than spinous part. First anal spine less than half length of second, which is longest and equal to distance between hindborder of eye and posterior nostril. Soft anal truncate, higher than spinous part. Pectorals half length of snout shorter than head or somewhat longer. Ventrals equal to postorbital part of head and half eye together. Ventral spine as long as distance between hindborder of eye and anterior nostril. Caudal slightly emarginate. Colour of preserved specimens brownish above, sides of head and body and belly silvery. Indications of ascending dark longitudinal lines above lateral line, following the rows of scales. Sometimes a yellowish band from head to caudal is present, with narrower bands above and below it. Fins light yellowish. Length 260 mm. (A specimen of Bleeker's collection in the Amsterdam Museum seen by us).

Nomen indig.: Djambian (Malay).

Habitat: Singapore; Sumatra (Benkulen, Padang, Trussan, Priaman); Banka; Java (Batavia!; Patjitan, Bantam); Duizend Islands!; Bawean; Bali; Lombok!; Celebes (Bulukomba, Badjoa, Menado); Ceram!; Ambon; Makjan; Waigeu. — Seychelles, coasts of British India, Tonkin, Philippines.

In sea.

10. **Lutjanus lineolatus** (Rüpp.)

?*Lutjanus erythropterus* Bloch, Ausländ. Fische IV, 1790, p. 115.
Diacope lineolata Rüppell, Atl. Reise Nördl. Afrika, Fische 1828, p. 76.
Serranus nouleny Cuvier & Valenciennes, Hist. Nat. Poissons II, 1828, p. 247.
Mesoprion caroui Cuvier & Valenciennes, ibid, p. 489.
Mesoprion xanthopterygius Bleeker, Verh. Bat. Gen. XII, 1849, Perc. p. 46.
Mesoprion erythropterus Bleeker ibid. p. 47.
Mesoprion caroui Cantor, Journ. Asiat. Soc. Bengal XVIII, 1850, p. 998.
Mesoprion lineolatus Günther, Cat. Brit. Mus. I, 1859, p. 205.
Mesoprion lineolatus Kner, Novara Exp. Fische I, 1865, p. 36.
Mesoprion lineolatus Playfair, Fishes of Zanzibar. 1866, p. 17.
Diacope lineolata Klunzinger, Verh. zool. bot. Gesellsch. Wien XX, 1870, p. 698.
Lutjanus lineolatus Day, Fishes of India, 1875—1888, p. 35.
Lutjanus erythropterus Bleeker, Verh. Akad. Amsterdam XIII, (1872) 1873. Révision Lutjanus. p. 29. — Atl. Ichth. VIII, 1876—1877, p. 53.
Mesoprion lineolatus Klunzinger, Fische des rothen Meeres I, 1884, p. 14.
Lutjanus erythropterus Sauvage, Poissons de Madagascar, 1891, p. 90.
?*Lutjanus erythropterus* Seale, Occ. Papers Bishop Mus. I, 1901, p. 78.
Mesoprion Caroui? Duncker, Mitth. Naturh. Mus. Hamburg, XXI, 1904, p. 148.
Lutianus nouleny Fowler, Journ. Acad. Nat. Sc. Philadelphia (2) XII, 1904, p. 524.
Lutjanus lineolatus M. Weber, Siboga Exp. Fische, 1913, p. 248.

Lutianus lineolatus Jordan & Starks, Ann. Carnegie Mus. XI, 1917, p. 449.
Lutjanus lineolatus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 144.

D. XI. 12(13). A. III. 8(9). P. 2. 14—15. V. I. 5. Ll. 49—51. Ltr. $\frac{\frac{5}{1}}{14}$.

Height 2.9—3.2, 3.6—4 in length with caudal. Head 2.6—2.8, 3.2-3.5 in length with caudal. Eye 3.7-4, equal to or a little less than snout, equal to or somewhat more than slightly convex interorbital space. Mouth somewhat oblique. Maxillary reaching to below anterior margin of pupil. A few rows of small teeth in the jaws, with an outer series of distant caninoid ones, those in front part of upper jaw and on the sides of the lower jaw still larger and fang-like. Small teeth on vomer and palatines; those on vomer forming a triangular patch with a very long pointed posterior prolongation. Palatine teeth in an elongate band. Preorbital and suborbital smooth, with many pores. About six transverse rows of scales on preoperculum, not counting the two, or three rows of smaller scales on lower preopercular limb. Posterior preopercular limb naked. Hind- and lower border of preoperculum denticulated. Preopercular notch scarcely developed. Anterior part of head naked. Scales beginning above middle of eyes, reaching in the centre of the interorbital space more forward, to above anterior margin of eyes. Temporal region scaly. Longitudinal rows of scales above lateral line running obliquely and ascending to dorsal profile, those below lateral line parallel to axis of body or nearly so. About 50—53 transverse rows of scales above, and about 49 rows below lateral line. First dorsal spine less than half length of second, which is as long as or somewhat shorter than third. Fourth or fourth and fifth spines longest, equal to postorbital part of head. Following spines gradually decreasing in length. Soft dorsal slightly rounded, lower than spinous part. First anal spine much less than half length of second, which is equal to or somewhat longer than third spine and equal to distance between hind-border of eye and posterior or anterior nostril. Soft anal truncate, the longest rays scarcely longer than longest spines. Pectorals half length of snout shorter than head, ventrals equal to postorbital part of head and half eye. Ventral spine as long as postorbital part of head. Caudal slightly emarginate. Colour of preserved specimens brownish above, sides of head and body and belly silvery. Indications of ascending dark longitudinal lines above lateral line and parallel to the axis of the body below, following the rows of scales. Fins light yellowish. Length 222 mm.

Habitat: Sumatra (Telokbetong, Padang, Siboga); Nias; Banka; Java (Batavia!, Patjitan); Duizend Islands!; Celebes (Makassar, Bulukomba); Lombok!; Sumbawa; Ambon!; Ceram!; Makjan. — Madagascar, Zanzibar, Red Sea, Arabia, British India, Ceylon, Pinang, Formosa, Philippines, Guam. In sea.

Note: Bleeker identified *L. erythropterus* of Bloch with this species, but both Day and Klunzinger, who examined typical specimens in the Berlin Museum, declare that they do not belong to this species but to *L. annularis* (= *sanguineus*). Later on, in the Atlas Ichth., Bleeker gave his opinion that Bloch had confused two different species in his *erythropterus* and that the description and figure certainly are based on a specimen of *lineolatus.*

Some authors have followed Bleeker, others Day and Klunzinger and as it remains doubtful, what Bloch meant with his *erythropterus,* we have thought it best, not to use it, to avoid further confusion.

This species is very close to *L. lutjanus,* differing chiefly in having one spine more in the dorsal.

11. **Lutjanus biguttatus** (C.V.)

Serranus biguttatus Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 507.
Mesoprion lineolatus Bleeker, Verh. Bat. Gen. XXII, 1849, Perc. p. 46 (nec Rüpp.).
Mesoprion bleekeri Günther, Cat. Brit. Mus. I, 1859, p. 208.
Epinephelus biguttatus Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 281 (errore).
Lutjanus biguttatus Day, Fishes of India, 1875—1888, p. 34.
Lutjanus biguttatus Bleeker, Verh. Akad. Amsterdam XIII (1872) 1873, Révision Lutjanus p. 32. — Atl. Ichth. VIII, 1876—1877, p. 54.
Lutjanus biguttatus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 136.

D. XI. 12. A. III. 8. P. 2.14. V. I. 5. Ll. 51—53. Ltr. $\begin{array}{c}5\\ \hline 1\\ \hline 14\end{array}$.

Height 3.5—3.8, 4.2—4.6 in length with caudal. Head 2.7—2.9, 3.3—3.4 in length with caudal. Eye 3.5—3.7, 1.1—1.2 in snout and somewhat less than scarcely convex interorbital space. Mouth somewhat oblique. Maxillary reaching to below anterior half of pupil. A few rows of small teeth in the jaws, with an outer series of distant caninoid ones, those in frontpart of upper jaw and sides of lower jaw larger and more or less fang-like. Small teeth on vomer in a triangular patch, with a short posterior prolongation.

A few rows of small teeth on palatines. Preorbital and suborbital smooth, with many pores. Six transverse rows of scales on preoperculum. Lower and posterior preopercular limb naked. Hind- and lower border of preoperculum denticulated. Preopercular notch slightly developed. Anterior part of head naked. Scales beginning above middle of eyes. Temporal region scaly. Longitudinal rows of scales above lateral line running obliquely and ascending to dorsal profile, those below lateral line parallel to the axis of the body. About 58 transverse rows of scales above and about 54 below lateral line. Dorsal spines slender. First spine one third of second or a little longer. Second shorter than third; third somewhat shorter than fourth spine, which is longest and equal to postorbital part of head. Following spines decreasing in length to the last, which is somewhat more than half length of second and scarcely shorter than penultimate one. Soft dorsal slightly rounded, less high than spinous dorsal. First anal spine about one third of second and third spines, which are subequal and as long as eye. Soft anal truncate, the longest rays longer than the anal spines. Pectorals somewhat longer than head without snout. Ventrals slightly more than eye and snout together. Ventral spine equal to snout. Caudal slightly emarginate. Colour of preserved specimens brown above, silvery on the sides and below. A dark brown band from snout through eye to base of caudal. Two pearly spots, above lateral line, one below seventh dorsal spine, the other below anterior half of soft dorsal. These markings are not always distinct. Pectorals axil dark. Fins yellowish. Length 266 mm.

Nomen indig.: Djambian (Malay).

Habitat: Sumatra (Telokbetong, Padang, Siboga); Nias!; Java (Batavia!); Duizend Islands!; Bali; Lombok!; Sumbawa; Celebes (Makassar!); Halmahera; Maitara; Ternate; Batjan; Ambon!; Waigeu!; New Guinea. — From Ceylon and coast of British India, Philippines, to Solomon Islands.

In sea.

12. **Lutjanus kasmira** (Forsk.)

Sciaena kasmira Forskål, Descr. Animalium, 1775. p. 46.
Holocentrus quinquelinearis Bloch, Ausländ. Fische, IV, 1790, p. 84.
Holocentrus quinquelineatus Bloch, loc. cit.
Holocentrus bengalensis Bloch, ibid. p. 102.
Diacope octolineata Cuvier & Valenciennes, Hist. Nat. Poissons II, 1828, p. 418.
Diacope notata Cuvier & Valenciennes, Op. cit. II, 1828, p. 422.
Diacope decemlineata Cuvier & Valenciennes, Op. cit. VI, 1830, p. 528.

Mesoprion octolineatus Bleeker, Verh. Bat. Gen. XXII, 1849, Perc. p. 40.
Mesoprion pomacanthus Bleeker, Nat. Tijdschr. Ned. Indië VIII, 1855, p. 407.
Genyoroge bengalensis Günther, Cat. Brit. Mus. I, 1859, p. 178.
Evoplites pomacanthus Gill, Proc. Acad. Nat. Sc. Philadelphia 1862, p. 234.
Mesoprion bengalensis Kner, Novara Exp. Fische I, 1865, p. 31.
Lutjanus pomacanthus Bleeker, Versl. Akad. Amsterdam (2) III, (1865) 1868, p. 72.
Lutjanus bengalensis Bleeker, ibid. p. 74.
Genyoroge amboinensis Day, Proc. Zool. Soc. London 1870, p. 679 (nec Blkr.).
Diacope kasmira Klunzinger, Verh. zool. bot. Gesellsch. Wien XX, 1870, p. 695.
Lutjanus bengalensis Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873, Révision Lutjanus, p. 34.
Lutjanus quinquelineatus Bleeker, ibid. p. 37.
Mesoprion bengalensis Günther, Fische der Südsee I, 1873, p. 12.
Lutjanus quinquelineatus Bleeker, Poissons de Madagascar 1875, p. 33.
Lutjanus bengalensis Bleeker, ibid. p. 35.
Lutjanus bengalensis Day, Fishes of India, 1875—1888, p. 33.
Lutjanus quinquelinearis Day, ibid. p. 46.
Lutjanus bengalensis Bleeker, Atl. Ichth. VIII, 1876—1877, p. 55.
Lutjanus quinquelineatus Bleeker, ibid. p. 56.
Genyoroge bengalensis Macleay, Descr. Cat. Austr. Fish. I, 1881, p. 28.
Mesoprion Kasmira Klunzinger, Fische des rothen Meeres I, 1884, p. 12.
Lutjanus kasmira Day, Fauna of Br. India, Fishes I, 1889, p. 468.
Lutjanus quinquelinearis Day, ibid. p. 479.
Diacope octolineata Sauvage, Poissons de Madagascar, 1891, p. 99.
Evoplites kasmira Jordan & Evermann, Fishes of North and Middle America II, 1898, p. 1246.
Lutjanus (Genyoroge) kasmira Steindachner, Denksch. Akad. Wien LXXI, 1902, p. 128.
Evoplites decemlineatus Fowler, Journ. Acad. Nat. Sc. Philadelphia (2) XII, Prt. 4, 1904, p. 524.
Lutjanus quinquelineatus Evermann & Seale, Bull. Bur. Fish. XXVI, 1906, p. 79.
Lutjanus caeruleolineatus Jordan & Seale, ibid. p. 262 (nec Rüpp.).
Lutjanus kasmira Jordan & Thompson, Proc. U. S. Nat. Mus. XXXIX, 1911, p. 446.
Lutjanus kasmira Snyder, Proc. U. S. Nat. Mus. XLII, 1912, p. 499.
Lutjanus kasmira M. Weber, Siboga Exp. Fische, 1913, p. 248.
Lutjanus quinquelinearis Regan, Ann. Durban Mus. I, Prt. 3, 1916, p. 168.
Lutjanus quinquelinearis Jordan & Starks, Ann. Carnegie Mus. VI, 1917, p. 449.
Lutjanus kasmira Mc Culloch, Checklist of fish of N. S. Wales. Prt. II, 1919, p. 56.
Lutjanus kasmira Fowler & Bean, Pr. U. S. Nat. Mus. LXII, 1922, p. 29.
Lutjanus kasmira Barnard, Ann. S. Afr. Mus. XXI, 1925—1927, p. 652.
Lutjanus kasmira Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 195.
Lutjanus notatus Mc Culloch, Checklist Fish Austr. Mem. Austr. Mus. V, 1929, p. 205.
Lutjanus spilurus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 153.
Lutjanus kasmira Fowler, ibid. p. 157.

D. X—XI. 13—16. A. III. 8 (9). P. 2.14—15. V. I.5. Ll. 53—78.
Ltr. $\begin{array}{c}6\text{—}9\\ \hline 1\\ \hline 21\text{—}24\end{array}$.

Height 2.6—3, 3.2—3.6 in length with caudal. Head 2.4—2.9, 3—3.4 in length with caudal. Eye 3—3.7, equal to or somewhat less than snout. Interorbital space scarcely convex, 1.3—1.4 in eye. Mouth slightly oblique. Maxillary reaching to below frontborder of pupil. Teeth in the jaws in narrow bands, with an outer series of distant caninoid ones. Teeth on vomer and palatines small, the former arranged in a ∧-shaped patch, the palatine teeth in a narrow band. Anterior part of head naked. Scales beginning above middle or anterior border of eye. Temporal region scaly. Suborbital sometimes scaly. Seven transverse rows of scales on preoperculum, not counting about two rows of scales on lower preopercular limb. The posterior preopercular limb is also scaled. Hind- and lower border of preoperculum strongly denticulated. Preopercular notch deep, receiving the well-developed interopercular knob. Longitudinal rows of scales above lateral line running obliquely and ascending to dorsal profile, those below lateral line parallel to the axis of the body. About 70—80 transverse rows of scales above and 60—65 rows below lateral line. Dorsal spines rather strong. First dorsal spine half length of second, which is shorter than third. Third or fourth and fifth spines longest, equal to or somewhat shorter than postorbital part of head. Following spines gradually decreasing in length. Soft dorsal slightly rounded, less high than spinous part. First anal spine much less than one half of second, which is stronger and longer than third and equal to snout or to snout and half eye together. Soft anal truncate or slightly rounded, the longest rays about equal to third spine. Pectorals half length of snout shorter than head. Ventrals as long as eye and snout or a little less. Ventral spine equal to postorbital part of head. Caudal emarginate, the lobes more or less pointed. In the typical *kasmira* the colour of preserved specimens is brownish above, yellowish below. Head and body with four light blue longitudinal bands, bordered above and below by a darkbrown line. The first band from above eye to middle of base of spinous dorsal, the second from upper part of hindborder of eye, sometimes continued on snout, to base of middle of soft dorsal; the third from hindborder of preoperculum to end of base of dorsal; the fourth from snout, below eye, to middle of base of caudal. Dorsal with a dark margin, other fins light yellowish. In the typical *quinque-*

lineatus the third band is continued forward through the preoperculum to the eye and there is a short band below the third from eye to end of operculum, where it joins the fourth band. A fifth band runs from base of pectorals to end of anal. Moreover there is a large black blotch below beginning of soft dorsal, for the greater part above lateral line and situated between the second and third longitudinal band. Intermediate forms occur. Length 273 mm.

Nomen indig.: Tanda-tanda (Malay), Remong (Tapah, Simalur), Gorara tikus (Ternate), Gorara siang (Menado), Gorara (Ambon).

Habitat: Singapore!; Pulu Weh!; Sumatra (Telokbetong, Benkulen, Ulakan, Priaman, Padang); Simalur!; Nias!; Java (Batavia, Bantam, Karangbollong, Prigi, Banjuwangi); Duizend Islands; Bawean; Bali; Lombok!; Flores!; Flores sea; Solor!; Rotti!; Timor; Celebes (Makassar, Bulukomba, Badjoa, Menado, Tanawenko, Cape Kait in Libani bay); Bara reef in Gulf of Boni; Dodepo and Pasejago Islands in Gulf of Tomini; Talaut Islands!; Saleyer!; Buton!; Halmahera, Ternate, Gomomo Island in Pitt Passage; Makjan; Batjan; Buru; Ceram; Ambon!; Goram!; Banda!; Kei Islands!; Waigeu!; Biak!; New Guinea. — East coast of Africa from Natal, Madagascar, Seychelles, Red Sea, Aden, coast of British India, Andamans, Annam, China, Japan, Riu Kiu Islands, Formosa, Philippines, Solomon Islands, New South Wales, Lord Howe Island, eastwards to Tahiti.

In sea.

Note. One of us has already given the reason, why we join the opinion of Klunzinger and Günther, that *kasmira* and *quinquelineatus* can not be considered as distinct species. The differences mentioned by Bleeker and Day do not hold good.

In our material from the Indo-australian Archipelago we generally counted ten dorsal spines and only exceptionally eleven, as well in typical *kasmira* as in specimens, which, according to their colour-pattern belong to the variety *quinquelineatus*.

13. **Lutjanus rufolineatus** (C.V.)

Diacope rufolineata Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 529.
Mesoprion rufolineatus Bleeker, Verh. Bat. Gen. XXII, 1849, Perc. p. 12.
Mesoprion amboinensis Bleeker, Nat. Tijdschr. Ned. Indië III, 1852, p. 259.
Mesoprion melanospilos Bleeker, ibid. p. 750.
Genyoroge amboinensis Günther, Cat. Brit. Mus. I, 1859, p. 183.
Genyoroge melanospilos Günther, l.c.

Lutjanus amboinensis Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 232. Verh. Akad. Amsterdam XIII (1872), 1873. Révision Lutjan. p. 40. Atl. Ichth. VIII, 1876—1877, p. 57.
Lutjanus luzonius Evermann & Seale, Bull. Bur. Fish. XXVI (1906), 1907, p. 79.
Lutjanus amboinensis Evermann & Seale, ibid. p. 81.
Lutjanus chrysotaenia Seale & Bean, Proc. U. S. Nat. Mus. XXXIII, 1908, p. 243 (nec Blkr).
Lutjanus rufolineatus M. Weber, Siboga Exp. Fische, 1913, p. 250.
Lutjanus rufolineatus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 150.
Lutjanus luzonius Fowler, ibid. p. 163.

D. X—XI. 13—15. A. III. 7—8. P. 2. 14—16. V. 1.5. Ll. 54—57. Ltr. $\begin{array}{c}7\\\hline 1\\\hline 20\end{array}$.

Height 2.4—2.7, 3.1—3.2 in length with caudal. Head 2.6—2.7, 3.2—3.3 in length with caudal. Eye 4—4.1, 1.3 in snout and about equal to somewhat convex interorbital space. Mouth slightly oblique. Maxillary reaching to below frontborder or middle of pupil. Teeth in the jaws in narrow bands, with an outer series of distant caninoid ones. Small teeth on vomer in a $\wedge$-shaped patch. Palatine teeth small, in a narrow band of a few rows. Anterior part of head naked. Scales beginning above anterior half of eye. Temporal region scaled. A few scales on suborbital. Seven transverse rows of scales on preoperculum, not counting about two rows of scales on lower preopercular limb. The posterior preopercular limb is also scaled. Hind- and lower border of preoperculum strongly denticulated. Preopercular notch deep, receiving the well developed interopercular knob. Longitudinal rows of scales above lateral line running obliquely and ascending to dorsal profile, those below parallel to the axis of the body. About 66 transverse rows of scales above and about 56 below lateral line. Dorsal spines rather strong. First spine half length of second, which is shorter than third. Third slightly less than fourth, which is longest and somewhat more than postorbital part of head. Soft dorsal moderately rounded, less high than spinous part. First anal spine much less than second, which is stronger and longer than third and equal to snout and half eye together. Anal moderately rounded, the longest rays as long as second spine. Pectorals half length of snout less than head. Ventrals as long as snout and eye together. Ventral spine equal to postorbital part of head. Caudal emarginate. Colour of preserved specimens yellowish brown, with indications of oblique light bands above lateral line and similar but broader horizontal bands below lateral line. A dark blotch below last dorsal spines, almost entirely above lateral line, may be present. Dorsal with a dark margin; other fins light yellowish. Axil of pectoral sometimes darkish. Length 220 mm. (Specimens of *L. amboinensis* of Bleeker's collection in the Amsterdam Museum seen by us).

Habitat: Pulu Weh!; Simalur!; Nias!; Bali; Borneo (Balikpapan!); Saleyer!; Celebes (Makassar!, Bulukomba, Badjoa, Menado), Labuandata Bay in Gulf of Boni, Dopedo Island in Gulf of Tomini; Sadaa Island; Ternate; Obi-major; Buru; Ceram; Ambon; Banda!; Waigeu; New Guinea (Doreh-= Manokwari). — Annam, Philippines.

In sea.

14. **Lutjanus sebae** (C.V.)

Diacope Sebae Cuvier & Valenciennes, Hist. Nat. Poissons II, 1828, p. 411.
Diacope siamensis Cuvier & Valenciennes, ibid. VI, 1830, p. 524.
Mesoprion Sebae Bleeker, Verh. Bat. Gen. XXII, 1849, Perc. p. 45.
Genyoroge sebae Günther, Cat. Brit. Mus. I, 1859, p. 176.
Lutjanus Sebae Bleeker, Versl. Akad. Amsterdam XIV, 1862, p. 106.
Mesoprion sebae Kner, Novara Exp. Fische I, 1865, p. 30.
Diacope Sebae Klunzinger, Verh. zool. bot. Gesellsch. Wien XX, 1870, p. 692.
Lutjanus sebae Day, Fishes of India, 1875—1888, p. 30.
Lutjanus Sebae Bleeker, Verh. Akad. Amsterdam XIII (1872) 1873, Révision Lutjanus p. 53. Atl. Ichth. VIII, 1876—1877, p. 62.
Genyoroge sebae Macleay, Descr. Cat. Austr. Fish. I, 1881, p. 28.
Mesoprion sebae Mc Culloch, Checklist of fish etc. of N. S. Wales. Part II, 1919, p. 56.
Lutianus sebae Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, p. 31.
Lutianus sebae Barnard, Ann. S. Afric. Mus. XXI, 1925—1927, p. 654.
Lutjanus sebae Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 176.
Lutjanus sebae Chevey, Travaux Inst. Ocean. Indochine. Mem. IV, 1932, p. 79.

D. XI. 15—16. A. III. 10—11. P. 2. 14—15 V. I. 5. Ll. 48—57.

Ltr. $\frac{7\frac{1}{2}}{\frac{1}{21-26}}$.

Dorsal profile ascending strongly in a straight line from snout to occiput. Height 2.2, 2.8 in length with caudal. Head 2.5, 3.1 in length with caudal. Eye 4.6—5.7, 2—2.2 in snout and scarcely less than convex interorbital space. Mouth rather oblique. Maxillary reaching to below frontborder of eye or nearly so. Small teeth in narrow bands in the jaws, with an outer series of more distant caninoid ones, those in frontpart of upper jaw and on sides of lower jaw somewhat larger. Small teeth on vomer in a triangular patch, on palatines in a very narrow band. Head naked. Scales beginning on occiput behind eye with a distinct post-temporal band, separated in the middle, as well as from the scales behind by a scaleless region. Temporal region naked. Six to seven transverse rows of scales on preoperculum. Inferior and posterior preopercular limb naked. Inferior and posterior preopercular border denticulated. Preopercular notch developed, but shallow, recieving the interopercular knob. Longitudinal rows of scales above and below lateral line oblique, ascending to dorsal profile. About 56 transverse rows of scales above and 52—54 below lateral line. Dorsal spines rather stout. First spine somewhat less than half length of second, which is not much shorter than third. Third spine longest, equal to postorbital part of head. Soft dorsal high and pointed, the median rays longest and equal to head without snout or a little longer. First anal spine less than half length of second, which is stronger but not longer than third one and somewhat more than diameter of eye. Soft anal deep and pointed, the median rays the longest, much longer than spines and equal to snout and eye or somewhat longer. Pectorals almost equal to head. Ventrals equal to snout and eye or somewhat longer. Ventral spine equal to snout. Caudal somewhat emarginate. Colour of preserved specimens whitish, with a reddish wash, each scale often with a pearly spot. Three dark brown bands, the first somewhat broader than diameter of eye, from origin of dorsal through eye to snout. The second beginning in finmembrane between third and sixth dorsal spines, running downwards and broadening considerably, so that on belly its breadth reaches from base to tip of ventrals. Third band beginning on finmembrane of last dorsal spine and anterior soft rays, running obliquely downward and backward to caudal peduncle, where it narrows and runs to the end of the lower caudal lobe. It is also continued on the soft dorsal, forming there a broad marginal blackish band. A similar band on anal. Upper lobe of caudal also with a broad dark band, similar to that of the lower lobe, but not connected with the bands on the body and sometimes only distinct in the distal part of the fin. Axil of pectoral darkish, forming part of the second band of the body and concealed by the fin. Ventrals blackish , still darker towards the lip. Length 260 mm.

Nomen indig.: Djenahah (Malay, Batavia).

Habitat: Singapore; Sumatra (Telokbetong, Padang, Siboga); Biliton; Java (Batavia); Bawean Islands!; Bali; Celebes (Makassar!, Bulukomba, Menado); Batjan; Ambon!; Waigeu; New Guinea. — East coast of Africa, Seychelles, Red Sea, coast of British India, Siam, Indochina, Philippines, North Australia, Percy Islands, New South Wales.

In sea.

15. **Lutjanus gibbus** (Forsk.)

Sciaena gibba Forskål, Descr. Animalium 1775, p. 46.
Lutjanus gibbus Bloch Schneider, Syst. Ichth. 1801, p. 326.
Holocentrus boutton Lacépède, Hist. Nat. Poissons IV, 1803, p. 331, p. 367.
Diacope lineata Quoy & Gaimard, Voyage Uranie & Physicienne. Zool. Poissons 1824, p. 309.
Diacope striata Cuvier & Valenciennes, Hist. Nat. Poissons II, 1828, p. 430.
Diacope bottonensis Cuvier & Valenciennes, ibid. p. 434. ibid. VI, 1830, p. 535.
Diacope coccinea Cuvier & Valenciennes, ibid. II, 1828, p. 437.
Diacope melanura Rüppell, Neue Wirbelthiere. Fische 1837, p. 92.
Mesoprion bottonensis Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 170.
Mesoprion janthinurus Bleeker, ibid. VI, 1854, p. 52.
Diacope coccinea Peters, Monatsber. Akad. Berlin 1855, p. 431.
Genyoroge gibba Günther, Cat. Brit. Mus. I, 1859, p. 180.
Genyoroge bottonensis Günther, ibid. p. 181.
Genyoroge melanura Günther, ibid. p. 183.
Lutjanus butonensis Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 155.
Mesoprion bottonensis Kner, Novara Exp. Fische I, 1865, p. 32.
Genyoroge bottonensis Playfair, Fishes of Zanzibar 1866, p. 16.
Diacope gibba Klunzinger, Verh. zool. Bot. Gesellsch. Wien XX, 1870, p. 693.
Diacope melanura Klunzinger, l.c.
Mesoprion gibbus Günther, Fische der Südsee I, 1873, p. 12.
Lutjanus butonensis Bleeker, Verh. Akad. Amsterdam. XIII (1872), 1873. Révision Lutjanus, p. 46. Atl. Ichth. VIII, 1876—1877, p. 59.
Lutjanus gibbus Day, Fishes of India 1875—1888, p. 43.
? *Genyoroge unicolor* Alleyne & Macleay, Proc. Lin. Soc. New S. Wales I (1876) 1877, p. 266.
? *Genyoroge unicolor* Macleay, Descr. Cat. Austr. Fish. I, 1881, p. 28.
? *Genyoroge bidens* Macleay, Proc. Lin. Soc. New S. Wales VII, 1882, p. 230.
? *Mesoprion Goldiei* Macleay, ibid. p. 233.
Mesoprion gibbus Klunzinger, Fische des rothen Meeres I, 1884, p. 12.
Diacope gibba Vaillant, Bull. Soc. Philom. (7) XI, 1887, p. 61.
? *Diacope calveti* Sauvage, Poissons de Madagascar 1891, p. 95.
Lutjanus tahitiensis Seale, Occas. Papers B. P. Bishop Mus. IV, 1906, p. 40.
Lutjanus gibbus Seale, ibid. p. 41.
Lutjanus gibbus Jordan & Seale, Bull. Bur. Fish. XXVI (1906), 1907, p. 20.
Lutjanus gibbus Jordan & Starks, Ann. Carnegie Mus. XI, 1917, p. 449.
Lutianus gibbus Barnard, Ann. S. Afric. Mus. XXI, 1925—1927, p. 655.
Lutjanus gibbus Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 201.
? *Lutjanus castelnaui* Whitley, Rec. Austr. Mus. XVI, 1928, p. 215.
? *Lutjanus castelnaui* Mc Culloch, Checklist Fish Austr. Mem. Austr. Mus. V, 1929, p. 205.
Lutjanus gibbus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 168.

D. X. 13—15. A. III. 8—9. P. 2.15. V. 1.5 Ll. 52—62. Ltr. $\begin{array}{c}6\frac{1}{2}-8\\ \hline 1\\ \hline 19-22\end{array}$.

In young and half grown specimens the upper profile of the head is straight, in large specimens (over 300 mm.) the profile of the snout is concave. Height 2.2—2.5, 2.9—3.4 in length with caudal. Head 2.4—2.6, 3.2—3.4 in length with caudal. Eye 3.2—5.1, equal to snout in young specimens, in old ones 1.4—2.3 in snout. Interorbital space almost flat in young, rather convex in adults, somewhat more or less than eye. Mouth somewhat oblique. Maxillary reaching to below frontborder of eye, not so far in large specimens. Small teeth in narrow bands in the jaws, with an outer series of distant caninoid ones; those in anterior part of upper jaw and on sides of lower jaw larger and sometimes fang-like. Small teeth on vomer in a ∧-shaped patch; palatine teeth in narrow bands. Anterior part of head naked. Scales beginning on occiput behind vertical through hindborder of eye. Temporal region naked. Five to six transverse rows of scales on preoperculum. Inferior and posterior preopercular limb naked. Inferior and posterior border of preoperculum denticulate, less so in adults, almost obsolete in very large specimens. Preopercular notch very deep and narrow, receiving the large interopercular knob. In very small specimens the notch is not yet developed, but in those of about 80 mm. it is already present. Longitudinal rows of scales above lateral line as well as below it running obliquely and ascending to dorsal profile. About 62—70 transverse rows of scales above and about 55—60 below lateral line. Dorsal spines rather slender; the first equal to half length of second in young specimens, shorter in old ones. Third, fourth, and fifth spines subequal, as long as postorbital part of head in young, equal to greatest length of operculum in adults. Soft dorsal rounded, less high than spinous part in young, higher than spinous part and more pointed in older specimens. First anal spine less than half length of second, which is stronger and longer than third one and about equal to postorbital part of head in young and to length of operculum in older ones. Soft anal much pointed, more rounded in young, the longest rays much longer than spines. Pectorals somewhat shorter than head. Ventrals almost as long as snout and eye together. Ventral spine equal to snout or somewhat shorter. Caudal deeply emarginate, especially in old specimens. Colour of preserved specimens brown or yellowish above, more or less silvery below, with or without dark oblique stripes on the body, following the longitudinal rows of scales. In young ones the posterior part of the caudal peduncle and the base of the caudal are darkbrown. Dorsal, anal and caudal with a black submarginal border and a chalky white marginal one, not always distinct on the caudal. Sometimes the soft dorsal and anal are dusky at base, sometimes light. Pectorals light yellowish. Axil of pectoral with a greyish spot, concealed by the fin. Ventrals leadcoloured in their distal third. Length 480 mm.

Nomen indig.: Tandu (Tapah, Simalur).

Habitat: Pulu Weh!; Simalur!; Batu Islands; Sumatra (Padang, Ulakan); Java (Semarang!, Patjitan); Bali; Lombok!; Flores!; Rotti!; Timor; Celebes (Makassar!, Bulukomba, Badjoa, Tanawanko, Tomariri, Menado!); Sangir Islands!; Buton; Halmahera; Ternate; Maitara; Batjan; Obi; Buru; Ceram; Ambon!; Gisser!; Goram!; Banda; Kei Islands!; Aru Islands!; Waigeu; New Guinea (Humboldt Bay!, South New Guinea). — Coast of Mozambique, Red Sea, coast of British India, Ceylon, Philippines, coast of Queensland, Pacific Islands eastwards to Poumotu Islands.

In sea.

Note. Following Klunzinger we have included *Diacope lineata* Q. G. = *Diacope striata* C.V. in the synonymy of this species. Günther and Bleeker considered it to be the same as *janthinuropterus* Blkr, but Klunzinger, who examined a specimen identified by Valenciennes, says that the transverse rows of scales below the lateral line are oblique, wheras they are horizontal in *janthinuropterus,* and that the specimen agrees with *gibbus.* This is in accordance with the statement of Cuvier & Valenciennes in respect to *Diacope striata*: „grise, avec des lignes brunes, étroites, parallèles, *qui descendent obliquement sur tout le corps*".

16. **Lutjanus sanguineus** (C.V.)

? *Lutjanus erythropterus* Bloch, Ausländ. Fische IV, 1790, p. 115.
Diacope sanguinea Cuvier & Valenciennes, Hist. Nat. Poissons II, 1828, p. 437.
Mesoprion rubellus Cuvier & Valenciennes, ibid. p. 475.
Mesoprion annularis Cuvier & Valenciennes, ibid. p. 484.
Mesoprion chirtah Cuvier & Valenciennes, ibid. p. 488.
Diacope annularis Rüppell, Atl. Reise N. Afrika, Fische 1828, p. 74. Neue Wirbelthiere 1835, p. 91.
Diacope annularis Quoy & Gaimard, Voyage Astrolabe 1834, p. 666.
Diacope metallicus Bleeker, Nat. & Geneesk. Arch. Ned. Indië II (3) 1845, p. 524, 525.
Mesoprion annularis Bleeker, Verh. Bat. Gen. XII, 1849, Perc. p. 47.
Mesoprion sanguineus Bleeker, ibid. p. 48.
Diacope (Mesoprion) rubella Rüppell, Samml. Senckenb. Mus. 1852, p. 3.
Mesoprion annularis Cantor, Journ. Asiat. Soc. Bengal 1850, p. 996.
Mesoprion annularis Bleeker, Verh. Bat. Gen. XXVI, 1854—1857, Nieuwe nalezingen ichth. Japan, p. 63.
Lutjanus annularis Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 241.

Mesoprion annularis Kner, Novara Exp. Fische I, 1865, p. 33.
Mesoprion annularis Playfair, Fishes of Zanzibar, 1866, p. 17.
Mesoprion chirtah Day, Proc. Zool. Soc. London, 1868, p. 150.
Diacope annularis Klunzinger, Verh. zool. bot. Gesellsch. Wien XX, 1870, p. 697.
Diacope sanguinea Klunzinger, l.c.
Lutjanus erythropterus Day, Fishes of India 1875—1888, p. 32.
Lutjanus chirtah Bleeker, Verh. Akad. Amsterdam XIII (1872) 1873, Révision Lutjanus p. 42. Atl. Ichth. VIII, 1876—1877, p. 58.
Mesoprion annularis Klunzinger, Sitzber. Akad. Wien 1880, p. 342.
Mesoprion annularis Macleay, Descr. Cat. Austr. Fish I, 1881, p. 30.
Mesoprion annularis Klunzinger, Fische des rothen Meeres I, 1884, p. 13.
Lutjanus annularis Day, Fishes of British India I, 1889, p. 466.
Lutianus annularis Jordan & Evermann, Proc. U. S. Nat. Mus. XXV, 1902, p. 343.
Lutianus dodecantheoides Jordan & Seale, Bull. Bur. Fish. XXVI (1906) 1907, p. 20 (nec Blkr).
Lutianus erythropterus Jordan & Thompson, Proc. U. S. Nat. Mus. XXXIX, 1911, p. 453.
Lutianus erythropterus Mc Culloch, Biol. Results Endeavour III, 1915, p. 141.
Lutianus erythropterus Barnard, Ann. S. Afric. Mus. XXI, 1925—1927, p. 657.
Lutjanus erythropterus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 165.

D. XI. 14. A. III. 8 (9). P. 2.14—15. V. I. 5. Ll. 63—66. Ltr. $\begin{array}{c}9-10\\ \hline 1\\ \hline 24-28\end{array}$.

Height 2.2—2.4, 2.7—2.8 in length with caudal. Head 2.5—2.8, 3—3.4 in length with caudal. Eye 4—4.4, 1.3—1.5 in snout, about equal to almost flat interorbital space in young specimens and 1.2 in more convex interorbital space of adults. Mouth rather oblique. Maxillary reaching to below frontborder of pupil (young) or frontborder of eye (adult). Small teeth in jaws in a few rows, with an outer series of distant moderate caninoid ones. Teeth on vomer in a ∧ -shaped patch. Palatine teeth in a very narrow band. Anterior part of head naked. Scales beginning on occiput behind vertical through hindborder of eye. Temporal region naked. Six to seven transverse rows of scales on preoperculum. Inferior and posterior preopercular limb scaleless. Inferior and posterior border of preoperculum denticulated. Preopercular notch almost absent. Longitudinal rows of scales above lateral line as well as below it running obliquely and ascending to dorsal profile. About 68—75 transverse rows of scales above and about 58—63 rows below Ll. Dorsal spines slender. First spine less than half length of second, which is shorter than third. Fourth spine longest, somewhat less than postorbital part of head. Following spines gradually decreasing in length. Soft dorsal somewhat rounded, the longest rays as long as longest spines. First anal spine much less than half length of second, which is subequal to third and as long as snout. Soft anal rounded, the longest rays much longer than anal spines. Pectorals half length of snout shorter than head. Ventrals equal to head without snout. Ventral spine as long as postorbital part of head. Caudal truncate or slightly emarginate. Colour of preserved specimens brownish above, silvery below. Dark longitudinal stripes on the body, following the rows of scales, faint in adults. A large blackish saddle-like blotch on dorsal part of caudal peduncle, bordered by a margaritaceous band, which is very broad and saddle-like in front, faint inferiorly and narrow posteriorly. A dark band on temporal region from eye to origin of dorsal in young ones, obsolete in older specimens. Dorsal, anal, caudal and ventrals with a broader or narrower black marginal band. Pectorals yellowish or dusky. Length 300 mm (Specimen of Bleeker's collection in the Amsterdam Museum examined by us).

Nomen indig.: Tembola, Kakap merah, Tambak merah, Ikan merah (Malay, Batavia); Kelellet (Cheribon); Bangbangan (Sundanese); Darongan, Sepah, Tassopah, Tambangan (Javanese); Moros, Dolossi (Batjan); Dawon lisseh (Menado); Delis (Ambon).

Habitat: Singapore; Sumatra (Tandjong, Benkulen, Padang, Ulakan, Tiku, Siboga); Simalur!; Nias!; Bintang; Banka; Biliton; Java (Batavia!, Bantam, Tjiringin, Cheribon, Tjilatjap, Samarang!, Japara, Patjitan, Surabaja, Passuruan, Probolingo, Besuki); Madura; Bali; Celebes (Makassar, Bulukomba, Badjoa, Menado); Batjan; Obi; Ambon; Arafura sea; New Guinea. — East coast of Africa, Red Sea, coast of British India, Siam, China, Japan, Philippines, coast of Queensland.

In sea.

Note. We have already explained under *L. lineolatus* why we don't use Bloch's name *erythropterus.* Bleeker calls this species *chirtah,* although he mentions *annularis* among the synonyms, which name has priority. He did so probably because Cuvier & Valenciennes named their *chirtah* after the „Chirtah" of Russel, who however did not use this name in a binomical sense. Most authors call this species *L. annularis,* but *Diacope sanguinea* C.V., the type of which has been reexamined by Day and by Klunzinger, certainly belongs to this species and has priority.

17. **Lutjanus malabaricus** (Bl. Schn.)

Sparus malabaricus, Bloch Schneider, Syst. Ichthyol. 1801, p. 278.

? *Diacope timoriensis* Quoy & Gaimard, Voyage de l'Uranie et de la Physicienne, Zool. 1824, p. 306.

? *Diacope calveti* Cuvier & Valenciennes, Hist. Nat. Poissons II, 1828, p. 429.

Mesoprion malabaricus Cuvier & Valenciennes, ibid. p. 480.

Mesoprion dodecacanthus Bleeker, Nat. Tijdschr. Ned. Indië IV, 1853, p. 104.

Mesoprion malabaricus Günther, Cat. Brit. Mus. I, 1859, p. 204.

Lutjanus dodecacanthus Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 354.

? *Lutjanus malabaricus* Day, Fishes of India 1875—1888, p. 31.

Lutjanus dodecacanthus Day, ibid. p. 33.

Lutjanus malabaricus Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873, Révision Lutjan. p. 50. Atl. Ichth. VIII, 1876—1877, p. 61.

Lutjanus malabaricus Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, p. 30.

Lutjanus malabaricus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 174.

D. XI. 14—15 (XII. 13—14). A. III. 8—9. P. 2. 14—15. V. I. 5.

Ll. 57—62. Ltr. $\frac{7-8}{\frac{1}{1}}$.

Height 2.2—2.3, 2.8 in length with caudal. Head 2.6—2.7, 3.2—3.3 in length with caudal. Eye 4—4.4, 1.3—1.7 in snout and almost equal to or somewhat more than somewhat convex interorbital space. Mouth somewhat oblique. Maxillary reaching to below frontborder of eye. A few rows of small teeth in the jaws, with an outer row of enlarged caninoid ones. Small teeth on vomer in a ∧-shaped or in a triangular patch. Palatine teeth small, in a few rows. Anterior part of head naked. Scales beginning on occiput behind eye. Temporal region naked. Seven transverse rows of scales on preoperculum. Inferior and posterior preopercular limb without scales. Posterior and inferior preopercular border denticulated. Preopercular notch shallow, receiving the well developed interopercular knob. Longitudinal rows of scales above lateral line and superior rows below lateral line oblique, ascending to dorsal profile; the lower ones on sides and belly parallel to the axis of the body. About 58—63 transverse rows of scales above and about 50—55 rows below lateral line. Dorsal spines rather stout. The first about half length of second, which is shorter than third. Third and fourth spines longest, equal to postorbital part of head. Soft dorsal pointed, the median rays much longer than the others, much longer than spines and as long as snout and eye together. First anal spine much less than half length of second, which is longer and stronger than third and equal to snout. Soft anal pointed, the median rays much longer than the others and than anal spines, equal to snout and eye or a little shorter. Pectorals almost as long as head. Ventrals about as long as snout and eye or half diameter of eye. Ventral spine equal to snout or somewhat longer. Caudal very slightly emarginate, almost truncate when expanded. Colour of preserved specimens light reddish above, more or less silvery below, with darker stripes following the longitudinal rows of scales on body and tail. A margaritaceous saddle-like patch on caudal peduncle immediately behind dorsal. A margaritaceous vertical band at end of caudal peduncle, widening superiorly, may be present. Fins light reddish. Dorsal and caudal with a narrow black margin. Membrane between second and third anal spine dusky, continued as a faint marginal band along anterior soft rays. Axil of pectoral dark, concealed by the fin. Length 480 mm.

Habitat: Singapore!; Nias!; Sumatra (Padang, Ulakan); Java (Batavia!); Borneo (Sandakan); Lombok!; Flores!; Buru; Ambon; Timor?; Mysore. — Red Sea, coast of British India; Formosa, Philippines, Solomon Islands.
In sea.

Note. We doubt if *Diacope timoriensis* Q. G. (= *Diacope calveti* C.V.) belongs to this species, as Quoy & Gaimard as well as Cuvier & Valenciennes record only 10 dorsal spines. The specimen described by Sauvage (Poissons de Madagascar) as *Mesoprion calveti* is certainly not *malabaricus*, as has already been observed by Fowler l.c. 1931, but probably *L. gibbus* and it is not impossible that Quoy & Gaimard's specimen also belongs to this species.

18. **Lutjanus dodecacanthoides** (Blkr.)

Mesoprion dodecacanthoides Bleeker, Nat. Tijdschr. Ned. Indië VI, 1854, p. 489.
Mesoprion dodecacanthoides Günther, Cat. Brit. Mus. I, 1859, p. 207.
Lutjanus dodecacanthoides Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 282. Verh. Akad. Amsterdam XIII (1872), 1873, Révision Lutjanus, p. 48. Atl. Ichth. VIII, 1876—1877, p. 60.

D. XII. 13. A. III. 8. P. 2. 14—15. V. I. 5. Ll. 47—48. Ltr. $\begin{array}{c}6\frac{1}{2}\text{—}7\\ \hline 1\\ \hline 20\text{—}21\end{array}$.

Height 2.3—2.5, 3—3.2 in length with caudal. Head 2.6—2.8, 3.3—3.4 in length with caudal. Eye 3.6—3.9, 1.2—1.3 in snout. Interorbital space flat in young, rounded in older specimens, 1.2—

1.5 in eye. Mouth oblique. Maxillary reaching to below frontborder of pupil. Small teeth in narrow bands in jaws, with an outer series of enlarged ones, those near symphysis of upper jaw strong canines. Small teeth on vomer in a ∧-shaped patch, on palatines in elongate somewhat curved bands. Anterior part of head naked. Scales beginning on occiput behind eye. Temporal region naked. Six transverse rows of scales on preoperculum. Hind- and lower preopercular limb naked. Posterior and inferior preopercular border denticulate. Preopercular notch shallow. Longitudinal rows of scales above and below lateral line oblique, ascending to dorsal profile. About 53—57 transverse rows of scales above and about 47—48 rows below lateral line. First dorsal spine equal to half length of second, which is shorter than third. Fourth dorsal spine longest, equal to postorbital part of head. Soft dorsal rounded, somewhat lower than spinous part. First anal spine less than half length of second, which is equal to third and slightly less than length of snout. Soft anal rounded. Pectorals less than half length of snout shorter than head. Ventrals as long as snout and eye together. Ventral spine shorter than postorbital part of head. Caudal emarginate. Colour of preserved specimens lightbrownish, with five to seven marroon longitudinal bands, the four superior ones running from hind border of head obliquely to base of dorsal; the lower ones parallel to axis of body. Length 220 mm. (The typical specimens of Bleeker's collection in the Leiden Museum seen by us).

Habitat: Sumbawa!; Ambon!. — Madras.
In sea.

Note. The specimen described by Jordan & Seale (Bull. Fish. XXVI, (1906, 1907, p. 20) as *Lutianus "dodecantheoides* (Blkr.)" is not this species but *L. sanguineus*.

19. **Lutjanus fulviflamma** (Forsk.)

Sciaena fulviflamma Forskål, Descr. Animalium, 1775, p. 45.
Perca fulviflamma Bloch Schneider, Syst. Ichthyol. 1801, p. 90.
Centropomus hober Lacépède, Hist. Nat. Poissons IV, 1803, p. 255.
Diacope fulviflamma Cuvier & Valenciennes, Hist. Nat. Poissons II, 1828, p. 423.
Diacope fulviflamma Rüppell, Atlas Reise N. Afrika, Fische 1828, p. 72. Neue Wirbelthiere, Fische 1837, p. 94.
Mesoprion fulviflamma Bleeker, Nat. Tijdschr. Ned. Indië III, 1852, p. 553.
Mesoprion fulviflamma Günther, Cat. Brit. Mus. I, 1859, p. 201.
Mesoprion fulviflamma Kner, Novara Exp. Fische I, 1865, p. 35.

Diacope fulviflamma Klunzinger, Verh. zool. bot. Gesellsch. Wien XX, 1870, p. 700.
Lutjanus fulviflamma Day, Fishes of India 1875—1888, p. 41 (partim).
Lutjanus fulviflamma Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873, Révision Lutjanus, p. 61. Atl. Ichth. VIII 1876—1877, p. 65.
Mesoprion fulviflamma Klunzinger, Fische des rothen Meeres I, 1884, p. 15.
Lutjanus fulviflamma Sauvage, Poissons de Madagascar 1891, p. 88.
Lutjanus fulviflamma Steindachner, Ann. Hofmuseum Wien, XI, 1896, p. 225.
Lutianus fulviflamma Jordan & Evermann, Proc. U. S. Nat. Mus. XXV, 1902, p. 343.
Lutianus fuscescens Seale, Occas. Papers B. P. Bishop Museum IV, 1906, p. 43 (nec C.V., fide Fowler 1928).
Lutianus fulviflamma Bean & Weed, Proc. U. S. Nat. Mus. XLII, 1912, p. 606.
Lutjanus fulviflamma McCulloch, Biol. Results "Endeavour" III, 1915, p. 141.
Lutjanus fulviflamma Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, p. 31.
Lutianus fulviflamma Barnard, Ann. S. Afric. Mus. XXI, 1925—1927, p. 660.
Lutianus fulviflamma McCulloch, Checklist of Fish of N. S. Wales, Part II, 1919, p. 55.
Lutjanus fulviflamma Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 199 (sine synon.). Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 128 (sine synon.).

Height 2.6—2.9, 3.3—3.6 in length with caudal. Head 2.5—2.9, 3.3—3.6 in length with caudal. Eye 3.9—4.4, 1.1.—1.5 in snout and more than nearly flat interorbital space. Mouth slightly oblique. Maxillary reaching to below middle of eye. Small teeth in a narrow band in jaws, with an outer series of distinct caninoids, those in frontpart of upper jaw and sides of lower jaw larger and fang-like. Small teeth on vomer in a triangular patch with a posterior prolongation. Sometimes the base of this prolongation is as long as that of the triangle, forming together a diamond-shaped patch. Palatine teeth small, in oval patches. Scales on occiput beginning behind or above hindborder of eye. Temporal region naked. Six transverse rows of scales on preoperculum. Upper and lower preopercular limb without scales. Posterior and inferior border of preoperculum rather feebly denticulate. Preopercular notch very shallow. Longitudinal rows of scales above lateral line oblique, ascending to dorsal profile, parallel to axis of body below it. About 55—62 transverse rows of scales above, and about 45—50 rows below lateral line. Dorsal spines not very strong. First spine half as long as, or somewhat shorter than second, which is more or much more than half length of third. Fourth spine longest and about equal to postorbital part of head. Soft dorsal somewhat rounded, less high than spinous part. First anal spine somewhat less than second, which is somewhat stronger but scarcely longer than third and equal to snout, and not much shorter than somewhat rounded soft anal. Pectorals half length of snout shorter than head. Ventrals as long as snout and eye together. Ventral spine as long as snout. Caudal slightly emarginate. Colour of preserved specimens reddish-brown above, silvery below. A large black blotch in lateral line, situated below posterior dorsal spines and anterior soft rays, often encircled by white. Dorsal and caudal more or less dusky, other fins pale yellowish. A dark pectoral axil spot. Length 286 mm.

Nomen indig.: Djenahah (Malay, Batavia), Tanda (Bintang), Nonda, Gorara (Batjan), Gorara-furo (Ternate).

Habitat: Singapore; Pulu Weh!; Sumatra (Telokbetong, Tandjong, Benkulen, Padang, Tiku, Priaman, Siboga); Simalur!; Nias!; Bintang; Banka; Biliton; Java (Batavia!, Bantam, Prigi, Banjuwangi); Bawean; Borneo (Sandakan); Celebes (Makassar!; Bonthain, Badjoa, Menado); Sangir Islands; Saleyer!; Flores!; Timor; Sula Islands!; Halmahera; Ternate; Makjan; Batjan; Buru!; Ceram!; Ambon; Kei Islands!; Schouten Islands!; New Guinea. — East coast of Africa, Madagascar, Red Sea, Seychelles, coast of British India, Siam, Hongkong, Formosa, Philippines, Queensland and New South Wales, New Britain, New Caledonia, Fiji, Tongatabu, Tahiti.

In sea, entering fresh water.

20. **Lutjanus russelli** (Blkr.)

Mesoprion Russelli Bleeker, Verh. Bat. Gen. XXII, 1849, Perc. p. 41.
Genyoroge notata Cantor, Journ. Asiat. Soc. Bengal XVIII, 1850, p. 994 (nec C.V.).
Lutjanus notatus Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 233 (nec. C.V.).
Genyoroge notata Playfair, Fishes of Zanzibar 1866, p. 15 (nec C.V.).
Mesoprion russelli Day, Proc. Zool. Soc. London 1867, p. 701.
Lutjanus fulviflamma Day, Fishes of India 1875—1888, p. 41 (partim).
Lutjanus Russelli Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873, Révision Lutjanus, p. 76. Atl. Ichth. VIII, 1876—1877, p. 71.
Lutjanus Russelli Steindachner & Döderlein, Denkschr. Akad. Wien XLVII, 1883, p. 236.
Lutianus johnii Ogilby, Cat. Fish New S. Wales, 1886, p. 9 (nec Bl.).
Lutjanus monostigma Sauvage, Poissons de Madagascar, 1891, p. 86 (nec C. V.).
Genyoroge lemniscata M. Weber, Jenaische Denkschr. VIII, 1895, p. 102 (nec. C.V.).
Lutianus johnii Waite, Mem. New S. Wales Nat. Club, 1904, p. 29 (nec Bl.).
Lutjanus fulviflamma var. *Russelli* Pellegrin, Bull. Soc. Zool. de France XIII, 1905, p. 85.
Lutianus russelli Seale, Occas. Papers B. P. Bishop Mus. IV, 1906, p. 43.

Lutianus nishikawa Smith & Pope, Proc. U. S. Nat. Mus. XXXI, 1906, p. 474.
Lutianus russelli Jordan & Seale, Bull. Bur. Fish. XXVI (1906) 1907, p. 20.
Lutianus quinquelineatus Jordan & Richardson, ibid. XXVII (1907) 1908, p. 258 (nec Bl.).
Lutianus fuscescens Jordan & Richardson, Mem. Carnegie Mus. IV, 1910, p. 184 (nec C.V.).
Lutianus russelli Jordan & Thompson, Proc. U. S. Nat. Mus. XXXIX, 1911, p. 450.
Lutianus russelli Jordan, Tanaka & Snyder, Journ. Coll. Sci. Univ. Tokyo XXVIII, Art. 1. 1913, p. 163.
Lutjanus monostigma de Beaufort, Bijdr. Dierkunde 1913, p. 117 (partim).
Lutianus russelli McCulloch, Biol. Results "Endeavour" III, 1915, p. 142. — Checklist of fish. etc. of New S. Wales, Prt. II, 1919, p. 55.

D. X. 14—15. A. III. 8. P. 2. 14. V. I. 5. Ll. 50. Ltr. $\begin{array}{c}7\\1\\\hline 16\text{—}17\end{array}$.

Height 2.7—2.9, 3.3—3.5 in length with caudal. Head 2.5—2.9, 3.1—3.5 in length with caudal. Eye 3.7—4.4, 1.2—1.5 in snout and more than nearly flat interorbital space. Mouth slightly oblique. Maxillary almost reaching to below middle of eye. Narrow bands of small teeth in the jaws, with an outer series of enlarged ones, a few of which near symphysis of upperjaw are slender canines. Small teeth on vomer in a ∧ -shaped or an arrow-shaped patch, on palatines in an elongate patch. Anterior part of head naked. Scales on occiput beginning above hinderborder of eye. Seven transverse rows of scales on preoperculum. Upper and lower preopercular limb naked. Posterior and inferior border of preoperculum denticulate. Preopercular notch very shallow. Longitudinal rows of scales above lateral line oblique, ascending to dorsal profile, parallel to axis of body below lateral line. About 57—62 transverse series of scales above and about 47 below lateral line. Dorsal spines not very strong. First spine less than half length of second. Third, fourth and fifth spines subequal, about as long as snout. Soft dorsal somewhat rounded, as high as spinous part. First anal spine less than half length of second, which is longer and stronger than third and equal to postorbital part of head. Soft anal scarcely rounded, higher than spinous part. Pectorals half length of snout shorter than head. Ventrals as long as head without snout. Ventral spine equal to postorbital part of head. Caudal slightly emarginate. Colour of preserved specimens brownish above, silvery below. An oblong dark patch, below anterior part of soft dorsal, crossed by the lateral line in such a way, that the greater part of the blotch is above it. Fins yellowish, border of dorsal and caudal somewhat dusky. In young specimens three dark longitudinal bands, the uppermost from snout through eye to base of soft dorsal; the second from hinderborder of eye, through lateral blotch, which is surrounded by a more or less distinct whitish ring, to upper caudal rays. Third from maxillary, through pectoral axil to base of lower caudal lobe. These bands disappear in adults, which have in life six or seven longitudinal oblique golden bands, disappearing in preserved specimens. Length 351 mm.

Nomen indig.: Djenahah (Malay, Batavia), Gorara (Ambon).

Habitat: Singapore; Sumatra (Tandjong, Benkulen, Trussan, Padang, Tiku, Priaman); Simalur!; Nias!; Batu Islands; Bintang; Banka; Biliton; Java (Batava!, Anjer); Bali; Celebes (Makassar); Sangir Islands; Flores!; Ternate; Halmahera; Ceram; Ambon!; Goram. — Madagascar, coast of Zanzibar, coast of British India, Malay Peninsula, Tonkin, Formosa!, Japan, Philippines, Solomon Islands, North Queensland and New South Wales.

In sea and estuaries.

21. **Lutjanus rangus** (C.V.)

Mesoprion rangus Cuvier & Valenciennes, Hist. Nat. Poissons II, 1828, p. 482.
Mesoprion rangus Bleeker, Nat. Tijdschr. Ned. Indië XVII, 1858-1859, p. 154.
Mesoprion rangus Günther, Cat. Brit. Mus. I, 1859, p. 199.
Lutjanus rangus Bleeker, Verh. Akad. Amsterdam XIII (1872) 1873, Révision Lutjanus, p. 59. Atl. Ichth. VIII, 1876—1877, p. 65.

D. X. 13—14. A. III. 8—9. P. 2. 14. V. I. 5. Ll. 51. Ltr. $\frac{6\frac{1}{2}}{\frac{1}{18}}$.

Height 2.8, 3.5 in length with caudal. Head 2.8, 3.5 in length with caudal. Eye 3.5, less than snout. Interorbital space flat, 1.5 in eye. Mouth slightly oblique; maxillary reaching almost to below middle of eye. Small teeth in narrow bands in the jaws, with an outer series of enlarged ones, some of which are canines. Teeth on vomer in a diamond-shaped patch, with short lateral prolongations; on palatines in a narrow band. Head naked anteriorly. Scales on occiput beginning behind eye. Temporal region naked. Six transverse rows of scales on preoperculum. Posterior and inferior preopercular limb naked. Posterior and inferior border of preoperculum denticulate. Preopercular notch shallow. Longitudinal rows of scales above lateral line running obliquely and ascending to dorsal profile, those below lateral line parallel to axis of body. Fourth and fifth dorsal spines longest, equal to postorbital part of head.

Soft part of dorsal rounded. Second and third anal spines subequal, equal to snout. Pectorals somewhat longer than postorbital part of head and eye together. Ventrals equal to postorbital part of head and half eye. Caudal slightly emarginate. Colour of preserved specimens brownish, silvery below. In life rose-coloured, with yellow longitudinal bands. Length 205 mm (A specimen of Bleeker's collection in the Leiden Museum seen by us).

Habitat: Singapore; Nias; Java; Borneo (Balikpapan!); Bali; Sumbawa; North Celebes. — Pinang, Honkong, British India, Muscat.

In sea.

22. **Lutjanus semicinctus** Q. G.

Lutjanus semicinctus Quoy & Gaimard, Voyage de l'Uranie et de la Physicienne, Zool. 1824, p. 303.

Mesoprion semicinctus Cuvier & Valenciennes, Hist. Nat. Poissons II, 1828, p. 485.

Mesoprion semicinctus Bleeker, Nat. Tijdschr. Ned. Indië V, 1853, p. 331.

Mesoprion semicinctus Günther, Fische der Südsee I, 1873—1875, p. 15.

Lutjanus semicinctus Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873, Révision Lutjanus, p. 55. Atl. Ichth. VIII, 1876—1877, p. 63.

?*Mesoprion sexfasciatus* Macleay, Proc. Linn. Soc. New S. Wales VIII, 1883, p. 255.

Lutianus semicinctus Seale, Occas. Papers B. P. Bishop Mus. IV, 1906, p. 43.

Lutjanus semicinctus Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 198. Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 103.

D. X. 13. A. III. 8. P. 2. 14. V. I. 5. Ll. 50. Ltr. $\begin{array}{c}5\frac{1}{2}\\ \hline 1\\ \hline 17\end{array}$.

Height 2.5—2.7, 3.1—3.2 in length with caudal. Head 2.5—2.6, 3—3.1 in length with caudal. Eye 4.2—5.2, 1.4—2 in snout and more than almost flat interorbital space. Mouth somewhat oblique. Maxillary reaching to below frontborder of pupil. Small teeth in narrow bands in the jaws, with an outer series of enlarged ones, some of which are moderate canines. Teeth on vomer in a triangular patch, on palatines in narrow bands. Temporal region naked. Scales beginning on occiput behind eye. About six transverse rows of scales on preoperculum. Posterior and inferior preopercular limb naked. Posterior and inferior border of preoperculum denticulate. Preopercular notch very shallow. Longitudinal rows of scales on body above lateral line running obliquely, ascending to dorsal profile; parallel to axis of body below lateral line. Fourth dorsal spine longest, equal to snout. Soft dorsal low, rounded.

Second and third anal spines subequal, about as long as sixth dorsal spine, less high than almost truncate soft anal. Pectorals half length of snout less than head, ventrals equal to postorbital part of head. Caudal hardly emarginate. Colour of preserved specimens brownish, more or less silvery below. Eight broad transverse bands on back, tapering towards belly. Caudal peduncle almost entirely dark brown. Length 252 mm (Specimens of Bleeker's collection in the Leiden Museum seen by us).

Habitat: Batjan; Obi; Gomomo Island in Pitt's Passage; Ternate; Halmahera; Doworra Island; Ambon; Goram; Waigeu; Rawak; New Guinea. — Admirality Islands, Solomon Islands, New Hebrides, Kingsmill Islands. Fiji Islands.
In sea.

23. **Lutjanus bohar** (Forsk.)

Sciaena bohar Forskål, Descr. Animalium, 1775, p. 46.
Lutjanus bohar Bloch Schneider, Syst. Ichth. 1801, p. 325.
Sparus lepisurus Lacépède, Hist. Nat. Poissons III, 1802, p. 404.
Diacope quadriguttata Cuvier & Valenciennes, Hist. Nat. Poissons II, 1828, p. 427.
Diacope bohar Cuvier & Valenciennes, ibid. p. 433.
Diacope bohar Rüppell, Atl. Reise N. Afrika, Fische, 1828, p. 73. Neue Wirbelthiere, Fische, 1837, p. 103.
Mesoprion quadriguttata Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 233.
Mesoprion bohar Günther, Cat. Brit. Mus. I, 1859, p. 190.
Mesoprion bohar Playfair, Fishes of Zanzibar, 1866, p. 17.
Diacope bohar Klunzinger, Verh. zool. bot. Gesellsch. Wien XX, 1870, p. 699.
Mesoprion bohar Günther, Fische der Südsee I, 1873—1875, p. 13.
Lutjanus bohar Day, Fishes of India 1875—1888, p. 44.
Lutjanus bohar Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873, Révision Lutjanus, p. 57. Atl. Ichth. VIII, 1876—1877, p. 64.
Mesoprion bohar Klunzinger, Fische des rothen Meeres I, 1884, p. 14.
Lutianus bohar Fowler, Proc. Acad. Science Philadelphia, 1899, p. 485.
Lutianus lepisurus Fowler, Journ. Acad. Sci. Philadelphia (2) XII, 1904, p. 525.
Lutianus bohar Barnard, Ann. S. Afric. Mus. XXI, 1925—1927, p. 659.
Lutjanus bohar Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 198. Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 107.

D. X. 13—14. A. III. 8. P. 2.15. V. I. 5. Ll. 52—55. Ltr. $\begin{array}{c}7-7\frac{1}{2}\\ \hline 1\\ \hline 21\end{array}$.

Height 2.5—2.8, 3.1—3.4 in length with caudal. Head. 2.6—2.7, 3.2—3.4 in length with caudal. Eye 3.5—4.3, 1.3—1.5 in snout and somewhat móre or less than almost flat interorbital space. Mouth somewhat oblique. Maxillary reaching to below frontborder of pupil. Small teeth in rather narrow bands in the jaws, with an outer series of enlarged ones, those on sides of lower jaw and especially two teeth in frontpart of upper jaw still larger and fang-like. Small teeth on vomer in a triangular patch and on palatines in an elongate oval patch. Head naked anteriorly. Scales on occiput beginning behind eye with a distinct oblique band, widely separated in the median line and from the scales behind by a scaleless region. Eight transverse rows of scales on preoperculum. Inferior ond posterior preopercular limb naked. Inferior and posterior border of preoperculum finely denticulate. Preopercular notch shallow. Longitudinal rows of scales above lateral line oblique, ascending to dorsal profile; those below parallel to the axis of the body. About 60—66 transverse rows of scales above and 50—53 rows below lateral line. Dorsal spines moderately strong. First spine equal to or less than half length of second, which is shorter than third. Third and fourth spines of equal length, about as long as snout. Soft dorsal rounded, less high than spinous part. First anal spine equal to or less than half length of second, which is generally stronger but not much longer than third and about equal to postorbital part of head. Soft anal slightly rounded, the longest rays somewhat more than second spine. Pectorals about half length of snout shorter than head. Ventrals as long as postorbital part of head or one half diameter of eye longer. Ventral spine scarcely longer than snout. Caudal emarginate. Colour of preserved specimens dark reddish-brown, lighter and more or less silvery below. Two large margaritaceous blotches on back, one below 8th dorsal spine, the other below last dorsal soft rays, disappearing with age. Scales of body and tail with white spots, forming oblique rows above, and horizontal rows below lateral line. Dorsal, especially distal half of spinous part, dark reddihs-brown. Anal more or less reddish-brown, especially in the anterior part of the soft portion of the fin, the first ray of which has a white border. Caudal light brownish, with a more or less distinct dark longitudinal band on the upper and lower lobe, bordered at the outside with a narrow white stripe. Pectorals yellowish, the superior part often darker and more or less violet-brown. Distal part of ventrals dark violet-brown, with the spine and the first ray white. Length 915 mm.

Nomen indig.: Mailah (Tapah, Simalur).

Habitat: Sumatra (Priaman, Padang); Simalur!; Batu

Islands; Nias; Java (Patjitan); Celebes (Makassar, Bulukomba, Menado); Flores!; Timor; Damar!; Batjan; Gomomo Island in Pitt's Passage; Ambon; Banda; New Guinea. — Coast of Natal and Mozambique, Red Sea, coast of British India, Philippines. — Pacific Islands eastwards to Tahiti and Paumotu Archipelago.

In sea.

24. **Lutjanus lunulatus** (Mungo Park)

Perca lunulata Mungo Park, Trans. Linn. Soc. III, 1797, p. 35.
Mesoprion lunulatus Cuvier & Valenciennes, Hist. Nat. Poissons II, 1828, p. 477.
Diacope bitaeniata Cuvier & Valenciennes, ibid. VI. 1830, p. 536.
Diacope bitaeniata Quoy & Gaimard, Voyage de l'Astrolabe, Poissons, 1834, p. 664.
Mesoprion lunulatus Bleeker, Act. Soc. Scient. Indo-Neerl. VIII, 1860. Achtste bijdrage Vischfauna Sumatra, p. 75.
Lutjanus lunulatus Day, Fishes of India, 1875—1888, p. 41.
Lutjanus lunulatus Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873, Révision Lutjanus, p. 64. Atl. Ichth. VIII, 1876—1877, p. 66.
Lutjanus lunulatus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 122.

D. X. 13—14. A. III. 8 (9). P. 2. 14—15. V. I. 5. Ll. 47—51. Ltr. $\frac{\frac{7}{1}}{18-21}$.

Height 2.7, 3.3 in length with caudal. Head 2.7, 3.3 in length with caudal. Eye 4.2, 1.6 in snout and more than slightly convex interorbital space. Mouth somewhat oblique. Maxillary reaching to below frontborder of pupil. Narrow bands of teeth in the jaws, with an outer series of enlarged ones, two of which in the frontpart of the upper jaw are canines; those on sides of lower jaw larger than those in front. Small teeth on vomer in a Λ-shaped patch. Teeth on palatines small, in an elongate band. Head naked anteriorly. Preorbital rugose. Scales beginning on occiput with a distinct oblique band behind hindborder of eye. Six or seven rows of scales on preoperculum. Inferior and posterior preopercular limb naked. Hindborder and lower border of preoperculum denticulate. Preopercular notch very shallow. Longitudinal rows of scales above lateral line oblique, ascending to dorsal profile, those below lateral line parallel to axis of body. About 56 transverse rows of scales above and 49 rows of scales below lateral line. Dorsal spines not very strong. First spine half as long as second, which is not much shorter than third. Third and fourth spines longest, scarcely as long as postorbital part of head. Soft dorsal rounded, about of equal height as spinous part. First anal spine less than second, which is stronger and longer than third and somewhat more than diameter of eye. Soft anal somewhat rounded, deeper than spinous part. Pectorals half length of snout shorter than head. Ventrals as long as postorbital part of head and half eye together. Ventral spine less than snout. Caudal emarginate. Colour of preserved specimens reddish-brown above, silvery below, with indications of light longitudinal stripes. Fins light reddish. Caudal with a broad, semilunar, dark vertical band, the proximal half of the median rays being darkbrown, the colour increasing in extent on the upper and lower rays, the outer ones nearly darkbrown all over, excepting the two exterior rays, which are again completely light. Length 255 mm.

Habitat: Simalur!; Sumatra (Padang, Priaman, Benkulen); Celebes. — Coast of Sind, Philippines.

In sea.

25. **Lutjanus vaigiensis** (Q. G.)

Diacope vaigiensis Quoy & Gaimard, Voyage de l'Uranie et de la Physicienne, Zool. 1824, p. 307.
Diacope marginata Cuvier & Valenciennes, Hist. Nat. Poissons II, 1828, p. 425.
Diacope immaculata Cuvier & Valenciennes, ibid. p. 430.
Diacope xanthopus Cuvier & Valenciennes, ibid. III, 1829, p. 495.
Diacope axillaris Cuvier & Valenciennes, ibid. VI, 1830, p. 532.
Diacope flavipes Cuvier & Valenciennes, ibid. p. 534.
Diacope analis Cuvier & Valenciennes, l. c.
Diacope aurantiaca Cuvier & Valenciennes, ibid. p. 536.
?*Diacope calveti* Temminck & Schlegel, Fauna Japonica, Poissons, 1843, p. 14 (nec C.V.).
Mesoprion Gaimardi Bleeker, Act. Soc. Sc. Indo-Neerl. VI, 1859, Enum. Piscium, p. 23.
Genyoroge marginata Günther, Cat. Brit. Mus. I, 1859, p. 181.
Lutjanus marginatus Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 155.
Mesoprion marginatus Günther, Fische der Südsee I, 1873—1875, p. 13.
Lutjanus marginatus Day, Fishes of India 1875—1888, p. 44.
Lutjanus flavipes Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873, Révision Lutjanus, p. 68. Atl. Ichth. VIII, 1876—1877, p. 68.
Lutjanus marginatus Bleeker, ibid. p. 72. ibid. p. 69.
?*Lutjanus malabaricus* Bleeker, Verh. Akad. Amsterdam XVIII (1877), 1878. Poissons Japon p. 7 (nec Bl. Schn.).
?*Mesoprion rubens* Macleay, Proc. Linn. Soc. New S. Wales VII, 1882, p. 232.
Mesoprion marginipinnis Macleay, ibid. VIII, 1883, p. 254.
Lutjanus marginatus Steindachner & Döderlein, Denkschr. Akad. Wien XLVII, 1883, p. 236.
Mesoprion mahagoni Meyer, Anal. Soc. Españ. Hist. Nat. XIV, 1885, p. 11 (nec C.V.).
Diacope marginata Sauvage, Poissons de Madagascar, 1891, p. 100.

Diacope analis Sauvage, ibid. p. 103.
Genyoroge (*marginata*?) M. Weber, Jenaische Denkschr. VIII, 1895, p. 102.
Genyoroge marginata Fowler, Proc. Acad. Sci. Philadelphia, 1899, p. 487.
Lutjanus marginatus Steindachner, Abh. Senckenb. naturf. Gesellsch. XXV, 1901, p. 415.
Lutjanus marginatus Jordan & Seale, Bull. Bur. Fish. XXV (1905), 1906, p. 263.
Lutjanus marginatoides Kendall & Goldsborough, Mem. Mus. comp. Zool. XXVI, 1911, p. 287.
Lutjanus vaigiensis Jordan & Thompson, Proc. U. S. Nat. Mus. XXXIX, 1911, p. 457.
Lutjanus vaigiensis Jordan, Tanaka & Snyder, Journ. Coll. Sci. Univ. Tokyo XXXIII, Art. I, 1913, p. 164.
Lutjanus marginatus M. Weber, Siboga Exp. Fische, 1913, p. 252.
Lutjanus waigiensis Barnard, Ann. S. Afric. Mus. XXI, 1925—1927, p. 656.
Lutjanus marginatus Fowler & Bean, Proc. U. S. Nat. Mus. LXXI, 1927, p. 6.
Lutjanus marginatus Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 200.
Lutjanus vaigiensis Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 115.

D. X. 13—14. A. III. 8 (9). P. 2. 13—14. V. I. 5. Ll. 47—50.

Ltr. $\begin{array}{c} 6\frac{1}{2}-7 \\ \hline 1 \\ \hline 17 \end{array}$.

Height 2.2—2.6, 2.8—3.3 in length with caudal. Head 2.4—2.6, 3—3.8 in length with caudal. Eye 3.5—4.6, 1.1—1.7 in snout and equal to or more than (in small specimens) rather convex interorbital space. Mouth scarcely oblique. Maxillary reaching about to below frontborder of pupil. Narrow bands of teeth in the jaws, with an outer series of enlarged ones, some of which are canines. Small teeth on vomer in a narrow bent band, forming an obtuse angle. Similar teeth in an elongate narrow band on palatines. Temporal region naked, sometimes with a few scales. Scales beginning on occiput with a more or less distinct band. Six transverse rows of scales on preoperculum. Inferior and posterior preopercular limb naked. Hindborder and lower border of preoperculum denticulate, in young specimens with a strong spine at angle. Preopercular notch well developed, except in young specimens. Longitudinal rows of scales above lateral line oblique, ascending to dorsal profile, those below lateral line parallel to axis of body. About 54—59 transverse rows of scales above, and about 44—47 rows below lateral line. Dorsal spines moderately strong. First spine somewhat more than half length of second, which is shorter than third one. Fourth longest, but not much longer than third and less than or equal to postorbital part of head. Soft dorsal rounded, about of equal height or somewhat lower than spinous part. First anal spine less than half length of second, which is as strong but somewhat longer than third and not much shorter than third dorsal spine. Soft anal somewhat rounded, its rays longer than spines. Pectorals about half length of snout shorter than head. Ventrals equal to head without snout or half diameter of eye shorter. Ventral spine equal to postorbital part of head. Caudal emarginate. Colour of preserved specimens brownish or olive above, silvery below, the scales of the sides each with a silvery spot, which form indistinct longitudinal bands; sometimes each alternate row of scales has larger confluent light spots, forming about five silvery longitudinal bands below lateral line. Base of dorsal light yellowish, blackish towards the margin, which is bordered by a narrow white line. Caudal blackish or dark-violet or brown, bordered by white; the median rays often darker than the rest of the fin. Anal, pectorals and ventrals yellowish. Length 488 mm.

Nomen indig.: Tambak (Malay, Bantam), Tutung ikuh (Tapah, Simalur), Gadja-kuning (Batjan, Ternate).

Habitat: Pulu Weh!; Sumatra (Benkulen, Trussan, Padang, Priaman); Simalur!; Nias!; Java (Bantam, Tjiringin, Batavia, Patjitan); Bali; Flores!; Saleyer!; Celebes (Makassar!, Badjoa, Menado!, Gorontalo, Cape Kait); Sangir Islands; Talaut Islands!; Timor; Sula Islands!; Halmahera; Ternate; Makjan; Batjan; Obi major!; Buru; Ceram!; Ambon!; Haruku; Nusa Laut!; Banda; Waigeu; Schouten Islands!; New Guinea. — Coasts of Natal and Mozambique, coast of South Arabia and of British India, Japan, Riu Kiu Islands, Philippines, Solomon Islands, New Hebrides, North Australia, Pacific Islands eastwards to Paumotu Islands.

In sea.

26. **Lutjanus janthinuropterus** (Blkr.)

Mesoprion striatus Bleeker, Verh. Bat. Gen. XXII, 1849, Perc. p. 44 (nec C.V.).
Mesoprion janthinuropterus Bleeker, Nat. Tijdschr. Ned. Indië III, 1852, p. 751.
Mesoprion lineatus Günther, Cat. Brit. Mus. I, 1859, p. 193 (nec Q. G.).
Lutjanus lineatus Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873, Révision Lutjanus, p. 70. Atl. Ichth. VIII, 1876—1877, p. 69 (nec Q. G.).
Diacope lineata Sauvage, Poissons de Madagascar, 1891, p. 101 (nec. Q. G.)
Lutjanus (Parkia) furvicaudata Fowler, Journ. Acad. Sci. Philadelphia (2) XII, Prt. 4, 1904. p. 525.
Lutjanus furvicaudatus Evermann & Seale, Bull. Bur. Fish. XXVI, 1906, p. 80.

Lutianus lineatus Barnard, Ann. S. Afric. Mus. XXI, 1925—1927, p. 658 (nec C. V.).
Lutjanus flavipes Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 123.
Lutjanus lineatus Fowler, ibid. p. 148 (nec Q. G.).

D. X. 13. A. III. 8. P. 2. 14. V. I. 5. Ll. 49—52. Ltr. $\begin{array}{c}7-7\frac{1}{2}\\ \hline 1\\ \hline 17-20\end{array}$.

Height 2.6—2.7, 3.2—3.4 in length with caudal. Head 2.6—2.7, 3.2—3.4 in length with caudal. Eye 4.1—5, 1.4—1.9 in snout and more than or equal to scarcely convex interorbital space. Mouth somewhat oblique. Maxillary reaching to below frontborder of pupil. Narrow bands of teeth in the jaws, with an outer series of enlarged ones, those on sides of lower jaw and in frontpart of upper jaw larger and caninoid; two of lastnamed still longer and more or less strong canines. Small teeth on vomer in a narrow bent band, forming an angle, similar teeth in an elongate patch on palatines. Head naked anteriorly. Scales beginning on occiput above hindborder of eye, with a distinct supra-temporal band. Seven or eight transverse rows of scales on preoperculum. Inferior and posterior preopercular limb naked. Hindborder and lower border of preoperculum denticulate. Preopercular notch very shallow and indistinct. Longitudinal rows of scales above lateral line oblique, ascending to dorsal profile, those below lateral line parallel to axis of body. About 63—65 transverse rows of scales above, and about 48—53 rows below lateral line. Dorsal spines slender. First spine somewhat less than second, which is shorter than third. Third or third and fourth spines longest, about equal to postorbital part of head. Soft dorsal rounded, lower than spinous part. First anal spine much less than half length of second, which is as strong as but somewhat longer than third spine, and not much shorter than longest dorsal spines. Soft anal slightly rounded, higher than spinous part. Pectorals half length of snout or less shorter than head. Ventrals scarcely less than head without snout; ventral spine equal to postorbital part of head. Caudal emarginate. Colour of preserved specimens brownish-olive above, silvery below. Caudal and broad marginal band of dorsal dark brown. Other fins yellowish. In young specimens a dark brown band, bordered above by a narrower light band, running from hindborder of eye to end of middle caudal rays. Length up to 600 mm (Specimens of Bleeker's collection in the Amsterdam Museum seen by us).

Nomen indig.: Tanda-tanda (Malay), Nona-sosal, Gorara-furu (Batjan), Gorara-siang (Menado), Gorara (Ambon), Tjablikan (Balikpapan).

Habitat: Singapore; Sumatra (Benkulen, Trussan, Padang, Tiku); Nias!; Java (Batavia!; Karangbollong, Prigi); Borneo (Balikpapan!); Celebes (Makassar, Bulukomba, Badjoa, Menado); Timor; Batjan; Obi major; Buru; Ceram; Ambon. — Coast of Natal, Madagascar, Christmas Island, Philippines, Solomon Islands, Queensland, Samoa.

In sea.

Note. Günther united *Mesoprion janthinuropterus* Blkr. with *Diacope lineata* Q. G. and Bleeker, as well as most later authors, followed him; but Klunzinger has been able to show, that lastnamed species is identical with *L. gibbus*, as we have mentioned under that species. The name *janthinuropterus* has therefore to be applied to the species described above, at least if *L. lemniscatus* does not belong to the same species.

27. **Lutjanus lemniscatus** (C.V.)

Serranus lemniscatus Cuvier & Valenciennes, Hist. Nat. Poissons, II, 1828, p. 240.
Lutjanus melanotaenia Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 244. Verh. Akad. Amsterdam XIII (1872), 1873, Révision Lutjanus, p. 66.
Lutjanus lemniscatus Day, Fishes of India 1875—1888, p. 36.
Lutjanus lemniscatus Bleeker, Atl. Ichth. VIII, 1876—1877, p. 67.

D. X. 13. A. III. 8. P. 2. 15. V. I. 5. Ll. 52—53. Ltr. $\begin{array}{c}7\\\hline 1\\\hline 19\end{array}$.

Height 2.6—2.7, 3.3 in length with caudal. Head 2.6—2.7, 3.3 in length with caudal. Eye 3.9—4.1, 1.3—1.4 in snout and more than interorbital space. Maxillary reaching to below middle of eye. Small teeth in narrow bands in the jaws, with an outer series of enlarged ones, some of which are canines. Teeth on vomer in a bent, narrow band, forming an obtuse angle, those on palatines in narrow bands. Temporal region naked. Scales beginning on occiput behind eye. Seven transverse rows of scales on preoperculum. Posterior and inferior limb of preoperculum naked. Hind- and lower border of preoperculum denticulate. Preopercular notch very shallow. Longitudinal rows of scales above lateral line running obliquely and ascending to dorsal profile, parallel to axis of body below it. Fourth dorsal spine longest, as long as postorbital part of head. Soft dorsal somewhat rounded, higher than spinous part. Pectorals half length of snout shorter than head. Ventrals equal to head without snout. Caudal slightly emarginate. Colour of preserved specimen (type of *L. melanotaenia*) darkbrown on sides of head and on back, excepting a narrow white stripe along base of dorsal. A darkbrown band from head to caudal, prolonged along median caudal rays. This band separated from the dark back by a white space, which is of equal depth in its whole course, forming a white band from head to caudal. In a larger specimen from Batavia the colour is brown above, silvery below, the two colours separated by an indistinct blackish longitudinal band from eye to end of median caudal rays. The lower caudal rays also darkish. Traces of a second band about 5 rows of scales lower. Length over 130 mm (Type-specimen of *Lutjanus melanotaenia* in the Leiden Museum seen by us).

Habitat: Sumatra (Westcoast); Java (Batavia!); Obi! — Ceylon.

In sea.

Note: It is not impossible, that this species is a young stage of *L. janthinuropterus.*

28. **Lutjanus monostigma** (C.V.)

Mesoprion monostigma Cuvier & Valenciennes, Hist. Nat. Poissons II, 1828, p. 446.
Mesoprion monostigma? Bleeker, Verh. Bat. Gen. XXII, 1849, Perc. p. 42.
Lutjanus monostigma Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 155.
Diacope monostigma Klunzinger, Verh. zool. bot. Gesellsch. Wien XX, 1870, p. 702.
Mesoprion monostigma Günther, Fische der Südsee I, 1873—1875, p. 14.
Lutjanus lioglossus Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873. Révision Lutjanus, p. 74.
Lutjanus lioglossus Day, Fishes of India, 1875—1888, p. 39.
Lutjanus lioglossus Bleeker, Atl. Icht. VIII, 1876—1877, p. 70.
Mesoprion lioglossus Klunzinger, Fische des rothen Meeres I, 1884, p. 14.
?*Lutjanus lioglossus* Steindachner, Abh. Senckenb. Naturf. Gesellsch. XXV, 1901, p. 415.
Lutjanus monostigma Jordan & Seale, Bull. Bur. Fish. XXV (1905), 1906, p. 264.
Lutjanus monostigma Evermann & Seale, ibid. XXVI (1906), 1907, p. 79.
Lutianus fulviflamma Seale, Occas. Papers B. P. Bishop Mus. IV, 1906, p. 43 (nec Forsk.).
Lutjanus monostigma de Beaufort, Bijdr. Dierk. 1913, p. 117 (partim).
Lutjanus monostigma Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 202. Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 125.

D. X. 13 (14). A. III. 8. P. 2. 14. V. I. 5. Ll. 46—54. Ltr. $\begin{array}{c} 6-6\frac{1}{2} \\ \hline 1 \\ \hline 16-19 \end{array}$

Height 2.7—2.9, 3.4—3.6 in length with caudal. Head 2.5—2.8, 3.1—3.5 in length with caudal. Eye 3.9—4.9, 1.5—1.8 in snout and more than somewhat convex interorbital space. Mouth somewhat oblique. Maxillary reaching to below frontborder of pupil or not so far in large specimens. Narrow bands of small teeth in the jaws, with an outer series of larger ones, some of which near symphysis of upper jaw are strong canines. Small teeth on vomer in a narrow bent band, forming an angle, and on palatines in an elongate band. Head naked anteriorly. Scales beginning on occiput above hindborder of eye with a distinct supra-temporal band of small scales. Six or seven transverse rows of scales on preoperculum. Posterior and inferior preopercular limb naked. Hindborder and lower border of preoperculum rugose. Preopercular notch very shallow and indistinct. Longitudinal rows of scales above lateral line oblique, ascending to dorsal profile, those below lateral line parallel to the axis of the body. About 51—56 transverse rows of scales above, and about 45—47 rows below lateral line. Dorsal spines slender. First spine less than half length of second, which is shorter than third. Third spine longest, equal to snout. Soft dorsal somewhat rounded, lower than or as high as spinous part. First anal spine much less than half length of second, which is about as long as third one and equal to diameter of eye. Soft anal truncate, much higher than spinous part. Pectorals half length of snout shorter than head. Ventrals somewhat less than head without snout; ventral spine about equal to snout. Caudal somewhat emarginate. Colour of preserved specimens brownish or brownish-violet above, silvery below, each scale with a more or less distinct silvery spot. A larger or smaller elongate blackish blotch in lateral line, below origin of soft dorsal. Axil of pectorals sometimes brownish. Fins yellowish or light reddish. Length 586 mm.

Nomen indig.: Djenahah (Malay), Kelalah (Tapah, Simalur).

Habitat: Sumatra (Padang); Simalur!; Nias!; Bintang; Java (Batavia); Si Amil Island near Borneo; Kapoposang in Makassar Strait; Celebes (Makassar!); Limbe Strait; Talaut Islands!; Sumba!; Flores!; Halmahera; Maitara; Doworra Island; Batjan; Ambon!; Waigeu!; New Guinea. — Red Sea, coast of British India, Philippines, Riu-Kiu Islands, Pacific Islands eastwards to Paumotu Islands.

In sea.

29. **Lutjanus decussatus** (C.V.) (Fig. 61. p. 286)

Mesoprion decussatus Cuvier & Valenciennes, Hist. Nat. Poissons II, 1828, p. 487.

Mesoprion decussatus Bleeker, Verh. Bat. Gen. XXII, 1849, Perc. p. 43.

Serranus decussatus Bleeker, Nat. Tijdschr. Ned. Indië, XVI, 1858—1859, p. 424 (errore).

Mesoprion decussatus Günther, Cat. Brit. Mus. I, 1859, p. 210.
Mesoprion decussatus Kner, Novara Exp. Fische I, 1865, p. 34.
Mesoprion therapon Day, Proc. Zool. Soc. London 1867, p. 574.
Lutjanus decussatus Day, Fishes of India 1875—1888, p. 47.
Lutjanus decussatus Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873, Révision Lutjanus, p. 79. Atl. Ichth. VIII, 1876—1877, p. 72.
Lutjanus decussatus Jordan & Seale, Bull. Bur. Fish. XXVI (1906), 1907, p. 21.
Lutjanus decussatus Evermann & Seale, ibid. p. 79.
Lutjanus decussatus Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, p. 31.
Lutjanus decussatus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 104.

D. X. 13. A. III. 8. P. 2. 14. V. I. 5. Ll. 49—52. Ltr. $\frac{6-6\frac{1}{2}}{\frac{1}{17}}$.

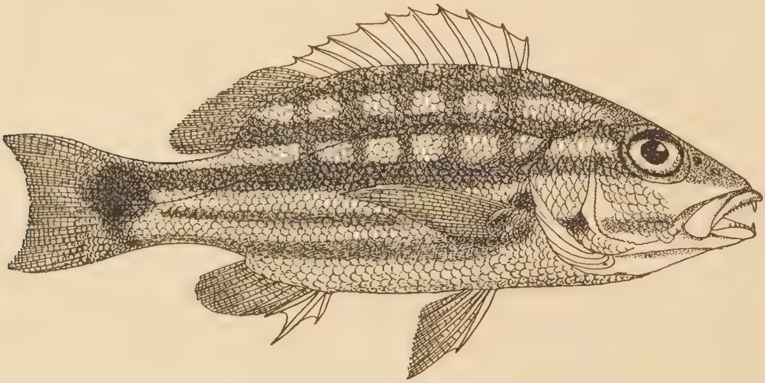

Fig. 61. *Lutjanus decussatus* (C.V.) 135 mm. × 3/4

Height 2.6—2.8, 3.4—3.6 in length with caudal. Head 2.5—2.7, 3.2—3.4 in length with caudal. Eye 4.1—4.8, 1.8 in snout and more than very slightly convex interorbital space. Mouth somewhat oblique. Maxillary reaching to below frontborder of eye. Small teeth in narrow bands in the jaws, with an outer series of enlarged ones, the anterior ones of which in the upper jaw are canines. Small teeth on vomer in a bent band in the form of an angle, on palatines in a narrow band. Head naked anteriorly. Scales beginning on occiput above hindborder of eye with a distinct supratemporal band. Seven transverse rows of scales on preoperculum. Posterior and inferior preopercular limb scaleless. Hindborder and lower border of preoperculum rugose, almost smooth in old specimens. Preopercular notch very shallow. Longitudinal rows of scales above lateral line oblique, ascending to dorsal profile, parallel to axis of body below it. 53—57 transverse rows of scales above, and 47—52 rows below lateral line. Dorsal spines slender.

First spine about half as long as second, which is shorter than third. Third to fifth spines longest, subequal, about as long as postorbital part of head. Soft dorsal rounded, about as high as spinous part. First anal spine shorter than second, which is stronger and longer than third and about as long as snout. Soft anal somewhat rounded, deeper than spinous part. Pectorals about one half length of snout shorter than head. Ventrals equal to postorbital part of head and half eye together, ventral spine equal to or somewhat shorter than snout. Caudal slightly emarginate. Colour of preserved specimens silvery. A median dark brown band from nape to origin of dorsal, where it splits in two bands, running on the scaly sheath of the dorsal. Five broad longitudinal bands on the sides, the first from nape to anterior part of soft dorsal, the second from above eye to posterior part of soft dorsal, the third from snout through eye to upper part of base of caudal, the fourth from operculum to lower part of base of caudal, the fifth, less distinct than the others, from maxillary through axil of pectoral, which is dark, to end of anal. These bands crossed on the back by six narrower transverse brown bands, dividing the back in three longitudinal rows of silvery blotches. A large darkbrown blotch in the median line at posterior end of caudal peduncle and on base of caudal. Fins yellowish, dorsal and caudal more or less dusky. Length 287 mm. (Specimen of Bleeker's collection in the Amsterdam Museum seen by us).

Nomen indig.: Tembota (Malay, Batavia), Kèrong bali (Tapah, Simalur).

Habitat: Sumatra (Benkulen, Trussan, Padang, Ulakan, Priaman, Siboga); Simalur!; Nias!; Biliton; Java (Batavia, Anjer, Bantam, Djongkulon, Prigi); Duizend Islands!; Bali; Lombok!; Borneo (Bontang!, Balikpapan!); Danawan and Si Amil Islands near Borneo; Kapoposang in Strait Makassar; Celebes (Makassar!, Bulukomba, Badjoa, Menado!, Tanawanko, Gorontalo); Saleyer!; Flores!; Rotti!; Timor; Ceram; Buru; Ambon; Ternate; Halmahera; Aru Islands. -- Coast of British India, Philippines.

In sea.

30. **Lutjanus rivulatus** (C.V.)

Diacope rivulata Cuvier & Valenciennes, Hist. Nat. Poissons II, 1828, p. 414.
Diacope coeruleopunctata Cuvier & Valenciennes, ibid. p. 424.
Diacope alboguttata Cuvier & Valenciennes, ibid. VII, 1831, p. 445.
Mesoprion myriaster Liénard, Nat. Hist. Soc. Mauritius, 1839, p. 32.

Mesoprion coeruleopunctatus Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 169.
Genyoroge rivulata Günther, Cat. Brit. Mus. I, 1859, p. 182.
Genyoroge rivulata Playfair, Fishes of Zanzibar 1866, p. 16.
Diacope rivulata Klunzinger, Verh. zool. bot. Gesellsch. Wien XX, 1870, p. 694.
Genyoroge caeruleopunctata Day, Proc. Zool. Soc. London 1870, p. 679.
Lutjanus rivulatus Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873, Révision Lutjanus, p. 81.
Lutjanus rivulatus Day, Fishes of India 1875—1888, p. 37.
Lutjanus rivulatus Bleeker, Atl. Ichth. VIII, 1876—1877, p. 73.
Mesoprion parvidens Macleay, Proc. Linn. Soc. New S. Wales VII, 1882, p. 234.
Lutjanus rivulatus Steindachner & Döderlein, Denkschr. Akad. Wien XLVII, 1883, p. 236.
Mesoprion rivulatus Klunzinger, Fische des Rothen Meeres I, 1884, p. 12.
Diacope rivulata Sauvage, Poissons de Madagascar 1891, p. 104.
Lutianus rivulatus Seale & Bean, Proc. U. S. Nat. Mus. XXXIII, 1908, p. 243.
Lutianus rivulatus Jordan & Thompson, Proc. U. S. Nat. Mus. XXXIX, 1911, p. 455.
Lutianus rivulatus Snyder, Proc. U. S. Nat. Mus. XLII, 1912, p. 499.
Lutianus rivulatus Barnard, Ann. S. Afric. Mus. XXI, 1925—1927, p. 655.
Lutjanus rivulatus Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 202. Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 111.
Lutjanus rivulatus Herre, Notes Fish Zool. Mus. Stanford Univ. 1934, p. 49.

D. X. 15. A. III. 8. P. 2. 15. V. I. 5. Ll. 46—47. Ltr. $\begin{array}{c} 7-7\frac{1}{2} \\ \hline 1 \\ \hline 20-21 \end{array}$.

Height 2.1—2.2, 2.6—2.8 in length with caudal. Head 2.5—2.6, 3—3.3 in length with caudal. Eye 4—4.5, 1.3—1.6 in snout and more than nearly flat interorbital space. Mouth oblique. Maxillary reaching to below frontborder of eye or of pupil. Small teeth in rather narrow bands in jaws, with an outer series of larger ones, the anterior of which in the upper jaw are moderate canines. Small teeth on vomer in a sharply bent band, in an elongate band on palatines. Head naked anteriorly. Scales beginning on occiput with a distinct supra-temporal band. Six transverse rows of scales on preoperculum, the posterior and inferior limb of which are naked. Posterior and inferior preopercular border denticulate. Preopercular notch shallow in young, narrower in old specimens. Interopercular knob distinct. Longitudinal rows of scales above lateral line oblique, ascending to dorsal profile, parallel to axis of body below it. About 48—52 transverse rows of scales above and 45—49 below lateral line. Dorsal spines robust. First spine half length of second, which is shorter than third. Third, fourth, and fifth spines longest, as long as postorbital part of head. Soft dorsal rounded, as high as spinous part. First anal spine scarcely less than half length of second, which is longer and stronger than third and equal to postorbital part of head. Soft anal rounded, deeper than spinous part. Pectorals one third of snout shorter than head. Ventrals without the filamentous prolongation of the first ray, as long as head without snout. Ventral spine as long as snout. Caudal slightly emarginate. Colour of preserved specimens violet-brown, more silvery below; each scale of the body with a pearly spot. Head with numerous wavy white stripes, bordered by dark lines, not always conspicuous. A chalk-white blotch in lateral line, below anterior part of soft dorsal (disappearing in formol-specimens), preceded by a darkbrown blotch. A transverse darkbrown band from origin of dorsal to that of pectorals, followed by some less distinct transverse bands. Fins yellowish, base of dorsal and anal often more or less darkbrown or violet. Ventrals also more or less violet, excepting the spine and the first ray with its filament, which are white. Length 330 mm.

Nomen indig.: Gaga (Batjan).

Habitat: Sumatra (Benkulen, Padang, Ulakan, Tiku, Priaman); Nias!; Java (Batavia, Prigi); Bawean; Borneo; Bali; Celebes (Makassar! Bulukomba, Badjoa, Menado!); Flores!; Timor; Batjan; Maitara; Buru; Ceram!; Ambon; Waigeu; New Guinea. — Coast of Natal, Madagascar, Zanzibar, Red Sea, coast of British India, Japan, China, Formosa, Philippines, Solomon Islands, Samoa.

In sea.

31. **Lutjanus niger** (Forsk.) (Fig. 62. p. 290)

Sciaena niger Forskål, Descr. Animalium 1775, p. 47.
Lutjanus niger Bloch Schneider, Syst. Ichth., 1801, p. 326.
Diacope macolor Lesson, Bull. Science Nat. XII, 1827, p. 138.
Diacope macolor Cuvier & Valenciennes, Hist. Nat. Poissons II, 1828, p. 415.
Diacope nigra Cuvier & Valenciennes, ibid. p. 431.
Diacope nigra Rüppell, Neue Wirbelthiere, Fische 1837, p. 93.
Mesoprion macolor Bleeker, Nat. Tijdschr. Ned. Indië III, 1852, p. 752.
Genyoroge nigra Günther, Cat. Brit. Mus. I, 1859, p. 176.
Genyoroge macolor Günther, l.c.
Macolor typus Bleeker, Act. Soc. Sc. Indo-Neerl. VIII, 1860, Dertiende Bijdr. Vischfauna Celebes, p. 25.
Proamblys niger Gill, Proc. Acad. Nat. Science Philadelphia 1862, p. 236.
Genyoroge macolor Playfair, Fishes of Zanzibar 1866, p. 14.
Diacope nigra Klunzinger, Verh. zool. bot. Gesellsch. XX, 1870, p. 696.
Lutjanus macolor Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873, Révision Lutjanus, p. 86. Atl. Ichth. VIII, 1876—1877, p. 75.

Mesoprion niger Klunzinger, Fische des rothen Meeres I, 1884, p. 11.
Lutjanus niger Day, Fishes of India. Suppl. 1888, p. 783.
Lutjanus niger M. Weber, Siboga Exp. Fische 1913, p. 253.
Lutjanus niger Ahl, Blätter f. Aquar. und Terrarienkunde XXXVII, 1926, Heft 16.
Macolor niger Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 179.
Macolor macularis Fowler, ibid. p. 181.
Macolor macolor Herre, Journ. Pan-Pacific Res. Institute VI, No. 4, 1931, p. 6.
Macolor macularis Herre, Notes Fish Zool. Mus. Stanford Univ. 1934, p. 49.

D. X. 14. A. III. 11. P. 2. 15—16. V. I. 5. Ll. 51—53. Ltr. $\begin{array}{c} 8—8\frac{1}{2} \\ \hline 1 \\ \hline 22—23 \end{array}$.

Dorsal profile of head very convex, snout short. Height 2.2—2.4, 2.9—3.1 in length with caudal. Head 2.6—2.8, 3.4—3.6 in length with caudal. Eye 3.7—3.8, slightly less than snout and less than interorbital space, which is scarcely convex in halfgrown specimens, but convex and even somewhat keeled in old specimens. Mouth oblique. Maxillary reaching almost to below middle of eye. Small teeth in narrow bands in the jaws, with an outer series of enlarged ones, those of sides of lower jaw directed more or less obliquely forward; a few of the teeth in frontpart of the upper jaw larger than the others. Small teeth on vomer in a sharply curved narrow band, on palatines in narrow bands. Head naked anteriorly. Scales beginning on occiput above or behind hindborder of eye with a distinct supra-temporal band. Seven transverse rows of scales on preoperculum, the posterior and inferior limb of which are naked. Posterior and inferior border of preoperculum strongly denticulate. Preopercular notch deep and narrow, recei-

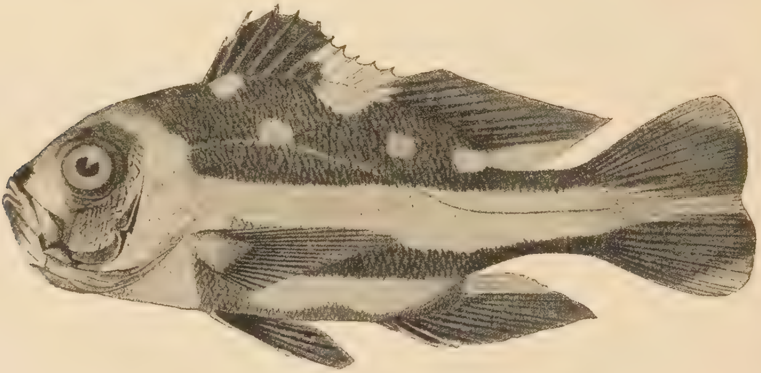

Fig. 62. *Lutjanus niger* (Forsk.) juv.

ving the elongate interopercular knob. Longitudinal rows of scales above lateral line oblique, ascending to dorsal profile, those below it parallel to the axis of the body. Dorsal spines slender. First spine less than half length of second, which is shorter than or as long as third. Second and third or third and fourth spines longest, equal to postorbital part of head. Soft dorsal pointed, much higher than spinous part. First anal spine less than half length of second; third longest, equal to snout. Soft anal pointed, much deeper than spinous part. Pectorals longer than head. Ventrals as long as pectorals, or, in large specimens, equal to snout and eye together. Ventral spine equal to postorbital part of head or somewhat longer. Caudal emarginate. This species seems to have two colour-phases. In the typical *niger* the body is darkbrown, each scale with a gray or blue spot or stripe, often forming vermiculations on upper part of head. This phase is apparently rarer in the Indo-australian Archipelago, from where Fowler has described it as *Macolor macularis*, but it is the only one known from the western part of the habitat. In the other phase, *macolor*, the colour of preserved specimens is darkbrown on back and upper half of sides, which have large oblong silvery patches, scattered irregularly in two or three rows. Lower half of sides and belly silvery, sharply defined from the darkbrown above. A broad darkbrown band from axil of pectoral to caudal, continued on lower caudal lobe, the upper-lobe being darkbrown like the back; the middle caudal rays often white, as a continuation of the silvery area between the brown of the upper parts and the dark band on the lower side. Head brownish above, silvery below. A broad brown band from lower margin of eye to posterior border of interoperculum. Anterior part of spinous dorsal and of soft dorsal darkbrown, posterior part of spinous and soft dorsal white. Spinous part and greater part of soft part of anal darkbrown, the posterior part white, as in the soft dorsal. Pectorals and ventrals darkbrown. In old specimens the darkbrown spreads over the whole of the head, body and fins and the fish assumes the coloration of the typical *niger*. Length 615 mm.

Habitat: Nias!; Celebes (Makassar!, Menado, Cape Kait); Sangir Islands; Tukang besi Islands!; Ternate; Makjan; Halmahera; Ambon; Haruku; Banda!; Waigeu; New Guinea. — East coast of Africa, Zanzibar, Red Sea, Aden, Maldives, Philippines, Solomon Islands, Samoa.

In sea.

Doubtful Species

Mesoprion erythrozona Bleeker, Nat. Geneesk. Arch. Ned. Indië II (3), 1845, p. 526.

Bleeker mentions this name, without author, when summing up the most common fishes found in the sea near Batavia. In his later papers no further reference to this species is made, which therefore is a nomen nudum. Perhaps it is a misprint for *erythropterus*.

Lutjanus Quoyi Bleeker, Versl. Akad. Amsterdam (2) II (1867), 1868, p. 296.

Bleeker proposed this name for *Dentex vaigiensis* Quoy & Gaimard, Voyage de l'Uranie et de la Physicienne, 1824, p. 302, which the authors describe as having teeth on the palate, and which therefore is certainly not a *Dentex*. Bleeker believed it to be a *Lutjanus*. The description given by Quoy & Gaimard is much too short to give it a place in this genus. The original specimen seems to be lost; at least it is not any more in the Paris Museum.

Diacope Gthr?. Hase, Jen. Zeitschr. f. Naturw. Bd. LI, 1914, p. 545.

Hase described and figured l.c. the head of a large *Lutjanus*, caught in the Sepik (Kaiserin Augusta) river. New Guinea, in fresh water. A certain determination is impossible.

2. **Pinjalo** Bleeker

(Bleeker, Nat. en Geneesk. Arch. Ned. Indië II (3), 1845, p. 521 (nomen nudum). Arch. Neerl. Sc. Nat. VIII, 1873, p. 179).

Body oblong, rather compressed, covered with small ctenoid scales, which are arranged in oblique transverse series on the body and tail, running caudad from ventral to dorsal profile. Lateral line continous, forming a gently curved line. Snout, maxillary, region round eye, posterior and inferior part of preoperculum naked. Operculum, suboperculum, upper part of preoperculum and cheeks scaly. The scales beginning on upper part of head above middle of eyes with a narrow supra-temporal band of scales, well defined by a broad scaleless interspace from the scales of the back. This band runs forwards and somewhat upwards to above middle of eyes, where it is separated from that of the other side by a broad scaleless area. Operculum with two flexible flat spines. Eye with an adipose eyelid. Mouth moderate, scarcely protractile, lips thin. Teeth in the jaws in a few rows, the outer row consisting of enlarged pointed teeth. Vomer with few rows of minute teeth, palatines with an irregular row of similar small teeth. Six branchiostegals. One single dorsal consisting of XI moderately strong homacanth spines and 14 branched rays. Origin of dorsal above that of pectorals and behind that of ventrals. Anal originating below beginning of soft dorsal, consisting of III spines, the first of which is very small, and 10 branched rays, ending below end of dorsal. Dorsal and anal with a scaly sheath. Pectorals long and somewhat falcate, pointed. Ventrals with a slender spine and five branched rays. A pointed axillary process at base of ventrals present. Caudal deeply incised. Pseudobranchiae present.

Distribution: That of the single species known.

1. **Pinjalo pinjalo** (Blkr.) (Fig. 63. p. 293)

Pinjalo typus Bleeker, Nat. en Geneesk. Arch. Ned. Indië II (3), 1845, p. 521 (nomen nudum).
Caesio pinjalo Bleeker, Nat. Tijdschr. Ned. Indië I, 1850, p. 102. Verh. Bat. Gen. XXIII, 1850, Maen. p. 10.

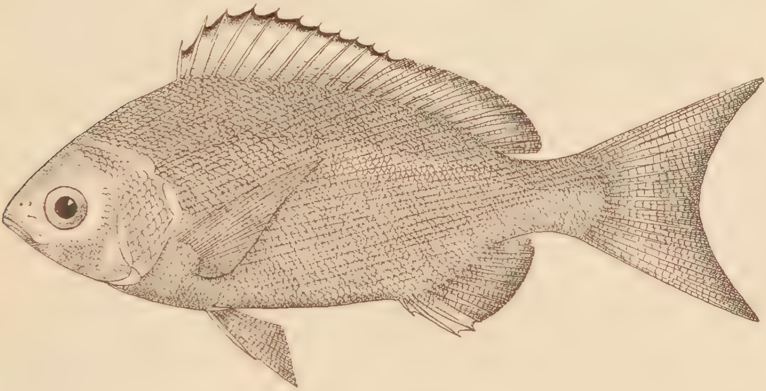

Fig. 63. *Pinjalo pinjalo* (Blkr) × 2/5

Mesoprion Mitchelli Günther, Ann. Mag. Nat. Hist. (3) XIX, 1867, p. 257.
Odontonectes pinjalo Day, Fishes of India, 1875—1888, p. 29.
Caesio pinjalo Day, ibid. p. 94.
Pinjalo typus Bleeker, Arch. Néerl. Sc. Nat. VIII, 1873, p. 179. Atl. Ichth. VIII, 1876—1877, p. 33.
Pinjalo typus Jordan & Seale, Bull. Bur. Fish. XXVI (1906), 1907, p. 21.
Pinjalo typus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 224.

D. XI. 14. A. III. 10 (11). P. 2. 16. V. I. 5. Ll. 65—68. Ltr. $\frac{\overset{8}{1}}{19}$.

Rather compressed, dorsal profile arched, ventral profile slightly convex. Height 2.3 to almost 3, 2.9—3.5 in length with caudal. Head 3.2—3.5, 4—4.4 in length with caudal. Eye 3.5—4.5, less than, equal to, or somewhat more than very convex interorbital space. Snout three fourths of eye, equal to eye or more than eye in large specimens. Mouth oblique. Maxillary reaching slightly beyond vertical through frontborder of eye. First dorsal spine half as long as second. Third spine longest, about equal to postorbital part of head. Dorsal decreasing gradually in height, the last soft dorsal ray somewhat less than eye. First anal spine small, second and third subequal, equal to snout and half eye together. Pectorals slightly less than length of head. Ventrals equal to postorbital part of head and half diameter of eye together, their origin at equal distance of origin of anal and of middle or frontborder of eye. Caudal slightly incised, the lobes somewhat pointed. Colour of alcohol specimens silvery, darker above. Scales of body with a longitudinal dark stripe, forming ascending dark lines. Dorsal with a darkish upper margin. Caudal darkish in its posterior part. Anal, pectorals and ventrals whitish. Axil of pectorals dusky. Length 455 mm (Specimen of Bleeker's collection in the Amsterdam Museum seen by us).

Nomen indig.: Pinjalo (Malay, Batavia).

Habitat: Singapore; Sumatra (Telokbetong, Padang); Java (Batavia!); Celebes (Makassar, Bulukomba); Buka Buka Island in Gulf of Tomini. — Coast of Coromandel, Annam, China, Malay Peninsula!, Philippines.

In sea.

3. **Caesio** Lacépède

(Lacépède, Hist. Nat. Poissons, III, 1802, p. 85).

Body oblong or elongate, somewhat compressed, covered with moderate or rather small ctenoid scales. Lateral line continuous, almost straight. Head conical or more or less pointed. Snout, maxillary, region round eye and postero-inferior part of preoperculum naked. Operculum, suboperculum, upper part of preoperculum and cheeks scaly. The scales beginning on upper part of head above eyes with a supra-temporal band of scales, well separate from those of the back by a narrow scaleless interspace. This band runs upwards and somewhat forwards to above eyes, where it joins that of the other side, or is separated from it by a scaleless interspace. Operculum with a single flexible blunt spine. Preoperculum entire. Eye with an adipose eyelid. Mouth rather small, somewhat protractile, lips very thin. Teeth in the jaws in one or more rows, in last case the outer row consists of enlarged teeth,sometimes with a few caninoid teeth near symphysis. Vomer and palatines in some species always, in other species sometimes provided with minute teeth, in still others toothless. Six or seven branchiostegals. One single dorsal consisting of X—XIII homacanth feeble spines. The first spine is minute or even rudimentary, the second more than half as long as the third or fourth. From this spine the spines and rays decrease gradually in height, the last soft ray often a little longer than the preceding one. Origin of dorsal above that of ventrals and behind that of pectorals. Dorsal and anal in a greater or lesser extent covered with scales. Anal originating below anterior part of soft dorsal, consisting of III spines, the first of which is very small, and 11—13 branched rays, decreasing slightly in depth posteriorly and ending below end of dorsal. Pectorals long and more or less falcate, pointed. Ventrals with a slender spine and five branched rays. A long and narrow pointed axillary process at base of ventrals present. Caudal deeply forked. Pseudobranchiae present.

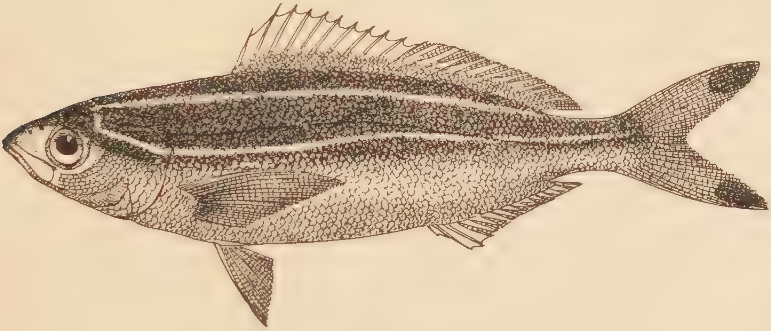

Fig. 64. *Caesio diagramma* Blkr. × 4/9

Distribution: Red Sea, subtropical and tropical parts of Indic and Pacific.

Key to the Indo-australian species of Caesio

I. D. XI—XII. 18—21, P. 2. 21. Caudal lobes with longitudinal black band, that of upper lobe continued into a dark lateral band on tail and body, bordered below by a broad metallic blue band (*Pterocaesio*) . . . . 1. *C. tile* p. 296.

II. D. X 14—15. P. 2. 16—19.
A. Teeth in jaws in several rows, the outer

row enlarged. Teeth on vomer and sometimes on palatines. Height 2.3—3.2 (*Odontonectes*):

- *a.* Supratemporal bands of scales continuous. Two caninoids near symphysis of lower jaw. Height 2.3—2.4. Caudal uniform yellow. . . . . 2. *C. erythrogaster* p. 298.
- *b.* Supratemporal bands of scales generally separated in the middle. Height 2.4. Caudal with dark tips . . . . 3. *C. lunaris* p. 299.
- *c.* Supratemporal bands of scales separated in the middle. Height 2.9—3.2. Caudal pale reddish yellow . . . . 4. *C. xanthonotus* p. 301.

B. Teeth in the jaws in a single row or nearly so. Generally no teeth on palate. Height 3.4—4.1.

- *a.* Height 3.9—4.1. Seven scales between lateral line and median dorsal spines. Tips of caudal black. . . . . 5. *C. pisang* p. 302.
- *b.* Height 3.4—3.7. Seven or eight scales between lateral line and median dorsal spines. Tips of caudal black . . . . . 6. *C. chrysozona* p. 303.
- *c.* Height 3.3—3.7. Nine scales between lateral line and median dorsal spines. Tips of caudal darkish . . . . 7. *C. diagramma* p. 305.
- *d.* Height 3.4—3.5. Seven and a half or eight scales between lateral line and median dorsal spines. Each caudal with a dark longitudinal band. . . . . . 8. *C. caerulaureus* p. 306.

1. **Caesio tile** C.V.

Caesio tile Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 428.
Caesio multiradiatus Steindachner, Verh. zool. bot. Gesellsch. Wien XI, 1861, p. 176.
Caesio tile Günther, Fische der Südsee I, 1873—1875, p. 34.
Pterocaesio multiradiatus Bleeker, Atl. Ichth. VIII, 1876, p. 41.
Caesio tile Jordan & Evermann, Proc. U. S. Nat. Mus. XXV, 1902, p. 350.
Pterocaesio tile Jordan & Seale, Bull. Bur. Fish. XXV (1905), 1906, p. 266.
Pterocaesio multiradiatus Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, p. 38.
Caesio tile Chabanaud, Bull. Soc. Zool. France L, 1925, p. 151.
Caesio tile Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 204.
Pterocaesio tile Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 202.

D. XI—XII. 18—21. A. III. 12—13. P. 2. 21. V. I. 5. Ll. 73—75.

Ltr. $\dfrac{7-7\frac{1}{2}}{\dfrac{1}{16}}$

Fusiform, dorsal and anal profile evenly convex from snout to caudal. Height 3.4, 4.3 in length with caudal. Head 3.6, 4.5 in length with caudal. Eye 3.7, equal to snout and somewhat less than convex interorbital space. Mouth somewhat oblique. Maxillary reaching to below frontborder of eye. Teeth in the upper jaw in two rows, the outer row consisting of moderate, conical teeth, the inner row of minute teeth. In the lower jaw a single row of teeth and a few teeth behind this row near symphysis. Palate edentulous. Supratemporal band of teeth 11 scales long, 3 scales deep laterally, 4 or 5 scales deep where it is confluent with that of the other side. Origin of dorsal slightly behind that of ventrals. First dorsal spine minute; third longest and equal to postorbital part of head and half eye together. Dorsal gradually decreasing in length posteriorly; last soft ray rather more than eye. Origin of anal opposite to third or fourth soft dorsal ray. First anal spine small, second and third subequal, somewhat longer than eye; last soft anal ray not much shorter. Pectorals pointed, longer than head. Ventrals equal to postorbital part of head and three fourths of eye, their origin almost at equal distance between tip of snout and origin of anal. Caudal deeply forked, the lobes pointed. Least height of caudal peduncle 1.4 in its length, slightly more than eye. Colour of alcohol specimens dark chocolate brown above, silvery below, the two areas sharply separated by a blackish band, beginning at lower side of supra-temporal band of scales on the head, running along lateral line to the caudal, where it is continued as a dark median stripe on the upper lobe of that fin, which is light yellowish. A similar band on lower lobe, so that the fin is bordered above, below and behind with light yellowish. Immediately below the dark longitudinal band a broad metallic-blue longitudinal band, beginning on head and ending near base of caudal, sharply defined from the dark band above and gradually merging into the silvery sides below. Dorsal brownish at base, other fins yellowish. Axil of pectorals and a blotch at upperpart of base of pectorals black. Length 221 mm.

Habitat: Ambon; Banda!. — Formosa, Philippines, Caroline Islands, Gilbert Islands, Tonga Islands, Society Islands.

In sea.

Note. Günther l.c. already united *C. tile* C.V. and *C. multiradiatus* Steind. Bleeker, who had apparently not seen Günther's paper when writing his account of *Caesio* for the Atlas Ichthyologique, founded the genus *Pterocaesio* on Steindachner's species, without having seen a specimen. The reasons for placing this species in a separate genus are not valid, according to us. The greater number of dorsal rays is a quantitative character, also found in *C. cylindricus* Gthr, a species closely allied to *tile*. The dentition is not different from some other species of the genus. The suboperculum and the operculum are scaly, at least in our specimens, exactly as in other members of the genus *Caesio*.

2. **Caesio erythrogaster** (K. v. H.) C.V.

?*Sparus cuning* Bloch, Ausl. Fische V, 1791, p. 31.
? *Cychla cuning* Bloch Schneider, Syst. Ichth. 1801, p. 336.
Caesio erythrogaster Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 442.
?*Caesio cuning* Cuvier & Valenciennes, ibid. p. 444.
Caesio erythrogaster Bleeker, Verh. Bat. Gen. XXIII, 1850. Maen. p. 9.
Odontonectes erythrogaster Günther, Cat. Brit. Mus. I, 1859, p. 265.
Caesio erythropterus Bleeker, Nat. Tijdschr. Ned. Indië XVIII, 1859, p. 365 (errore).
Caesio erythrogaster Kner, Novara Exp. Fische I, 1865, p. 64.
Caesio cuning Day, Fishes of India 1875—1888, p. 95.
Caesio erythrogaster Bleeker, Arch. Neerl. Sc. Nat. VIII (1872), 1873, Révision Caesio, p. 162. Atl. Ichth. VIII, 1876—1877, p. 36.
Caesio erythrogaster Klunzinger, Sitzber. Akad. Wien 1880, p. 352.
Caesio erythrochilurus Fowler, Journ. Acad. Nat. Sci. Philadelphia (2) XII, 1904, p. 528.
Caesio cuning Evermann & Seale, Bull. Bur. Fish. XXVI, 1906, p. 83.
Caesio lunaris Fowler, Proc. Acad. Nat. Sci. Philadelphia 1927, p. 278 (nec C.V.).
Caesio cuning Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 203.
Caesio erythrogaster Mc Culloch, Checklist Fish Austr. Mem. Austr. Mus. V, Prt. II, 1929, p. 202.
Caesio cuning Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 220.

D. X. 15. A. III. 11. P. 2. 16—17. V. I. 5. Ll. 52—58. Ltr. $\begin{array}{c}6-7\\\hline 1\\\hline 15-16\end{array}$

Upper and lower profile evenly arched. Profile of head sloping down steeply, in a slightly concave line, from above eye to snout. Height 2.3—2.4, 3—3.2 in length with caudal. In specimens below 200 mm.: 2.6—2.7, 3.5—3.6 in length with caudal. Head 3.1—3.5, 4—4.6 in length with caudal. Eye 3.4—4.5, about equal to snout. Interorbital space very convex, almost keeled. Mouth very oblique. Maxillary truncate behind, reaching to below frontborder of eye. Teeth in upper jaw in a few rows, the outer one enlarged. In the lower jaw an outer row of enlarged ones, with two caninoids at symphysis and a few rows of smaller teeth, not continued laterally. A row of minute teeth on vomer and on palatines. Snout and region round eye naked. A sharply defined scaly band, about 5 scales deep and 10 scales long, beginning in supra-temporal region and running forwards and somewhat upwards to dorsal profile, where it joins that of the other side. Behind this band and separated from it by a narrow scaleless interspace about 21 rows of scales to base of dorsal. Temporal region naked. Opercular region scaly, with exception of the posterior and inferior preopercular limb. Origin of dorsal above that of ventrals. First dorsal spine minute, fourth longest, about equal to postorbital part of head. Dorsal gradually decreasing in height posteriorly, last soft ray about as long as snout. Origin of anal below third dorsal ray. First anal spine minute, second and third subequal, about as long as snout; last anal ray not much shorter. Pectorals long and pointed, more than one diameter of eye longer than head. Origin of ventrals at equal distance from corner of mouth and origin of anal, about as long as head without snout. Caudal deeply forked, the lobes pointed. Least height of caudal peduncle 1.3 in its length, equal to snout and half eye together. Colour of preserved specimens reddish-violet above, silvery below. Fins yellowish. Dorsal with a dark border. Axil of pectorals dark. Colour of a fresh specimen: Upper part and sides of head, and anterior part of back metallic violet-blue, posterior part of back metallic greenish-yellow. Underparts silvery, with a violet hue and whashed with pink at isthmus and above anal. Scaleless parts of head shining greenish. Dorsal reddish in front, otherwise yellow, with a narrow black outermargin. Caudal yellow. Anal, ventrals and pectorals pinkish. Axil of pectorals black. Iris red. Length 355 mm.

Nomen indig.: Ekor kuning (= Yellow tail) (Malay, Batavia), Lepi (Balikpapan).

Habitat: Singapore!; Sumatra (Telokbetong, Priaman, Padang, Siboga); Batu Islands; Nias; Bintang; Banka; Duizend Islands!; Java (Batavia!, Bantam); Bawean Islands; Borneo (Balikpapan!, Sitanki Reef); Daisy Island and Si Amil Island near Borneo; Celebes (Makassar!, Bulukomba, Badjoa); Dodepo and Pasejogo Islands; Limbe Strait; Sadaa Island in Gulf of Boni; Saleyer!; Tanakeke Island in Flores Sea; Halmahera; Ambon; Buru; Ceram; New Guinea. — Coasts of British India, Siam, Philippines, Okinawa, North Australia, Fitzroy Islands, Solomon Islands.

In sea.

3. **Caesio lunaris** C.V.

Caesio lunaris Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 441.
Coesio lunaris Lesson, Voyage Coquille, Zool. II, 1830, p. 186.
Caesio lunaris Rüppell, Neue Wirbelthiere, Fische, 1837, p. 120.
Caesio lunaris Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 177.

Caesio lunaris Günther, Cat. Brit. Mus. I, 1859, p. 390.

Caesio lunaris Klunzinger, Verh. zool. bot. Gesellsch. Wien XX, 1870, p. 769.

Caesio lunaris Bleeker, Arch. Neerl. Sc. Nat. VIII (1872), 1873, Révision Caesio, p. 165. Atl. Ichth. VIII, 1876—1877, p. 37.

Caesio lunaris Klunzinger, Fische des rothen Meeres I, 1884, p. 46.

Caesio lunaris Seale & Bean, Proc. U. S. Nat. Mus. XXXIII, 1908, p. 243.

Caesio lunaris Bean & Weed, ibid. XLII, 1912, p. 606.

Caesio lunaris Fowler & Bean, ibid. LXII, 1922, p. 37.

Caesio lunaris Vinciguerra, Ann. Mus. Civ. Genova (3) X, (L), 1926, p. 572.

Caesio lunaris Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 203.

Caesio lunaris Duncker & Mohr, Mitt. Zool. Mus. Hamburg XLIV, 1929, p. 65.

Caesio lunaris Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 205. Proc. Acad. Nat. Sci. Philadelphia LXXXVI, 1934, p. 73.

D. X. 14. A. III. 11. P. 2.19. V. 1.5. Ll. 57. Ltr. $\frac{6-7}{1 \atop 18}$.

Upper and lower profile evenly convex. Profile of head descending in an evenly curved line from nape to snout. Height 2.4, 3.2 in length with caudal. Head 3.1, 4.1 in length with caudal. Eye 4.4, slightly less than snout. Interorbital space very convex. Mouth very oblique. Maxillary truncate behind, reaching to below frontborder of eye. A villiform band of teeth, with an outer row of enlarged teeth, in both jaws; the band in the lower jaw not continued on the sides, where only one row of teeth is present. Vomer with a narrow band of minute teeth. Snout and region round eye naked. A sharply defined scaly band in temporal region, about 3 scales deep and 19 scales long, beginning in temporal region and running upwards to dorsal profile, separated from that of the other side by a scaleless interspace; seldom the two bands are united. Behind this band and separated from it by a scaleless interspace about 20 rows of scales to origin of dorsal. Opercular region scaly, with exception of the posterior and inferior preopercular limb. Origin of dorsal above origin of ventrals. First dorsal spine minute, third longest, equal to postorbital part of head; the fin decreasing in height posteriorly. Last dorsal ray equal to eye. Origin of anal below third dorsal ray. First anal spine minute, second and third subequal, as long as snout. Last anal ray as long as eye. Pectorals long and pointed, half diameter of eye longer than length of head. Origin of ventrals nearer to origin of anal than to corner of mouth, about as long as postorbital part of head and half eye together. Caudal deeply forked, the lobes more or less rounded. Height of caudal peduncle 1.3 in its length, equal to snout and one third of eye together. Colour of preserved specimen dark violet-brown, belly pale yellowish. Dorsal yellowish, with a dark outer margin. Caudal violet-brown, the tips darker. Anal, pectorals and ventrals yellowish. Axil of pectorals dark. Length 325 mm.

Nomen indig.: Pisang-pisang (Malay, Batavia).

Habitat: Java (Batavia!); Borneo (Sarawak); Bali; Celebes (Binang Buang, Cape Kait); Limbe Strait; Labuan Blanda Island in Buton Strait; Tanakeke Island; Ternate; Gomomo Island in Pitt Passage; New Guinea. — Madagascar, Zanzibar, Red Sea, Sokotra, Aden, Tonkin, Japan, Philippines, New Ireland, New Britain, Solomon Islands.
In sea.

Note. This species, which seems to be rather common in the Red Sea, is apparently rare in the Indo-australian Archipelago. In the bay of Batavia it occurs on the coral reefs together with the common *C. erythrogaster*, but is very much rarer, as Prof. Delsman informs us. It is easily distinguished from *C. erythrogaster* by the much narrower temporal band of scales, which does not join that of the other side as a rule.

4. **Caesio xanthonotus** Blkr.

Caesio xanthonotus Bleeker, Nat. Tijdschr. Ned. Indië IV, 1853, p. 466. Arch. Neerl. Sci. Nat. VIII (1872), 1873, Révision Caesio, p. 167. Atl. Ichth. VIII, 1876—1877, p. 37.
Caesio teres Seale, Occas. Papers B. P. Bishop Mus. VI, No. 1, 1906, p. 44.
Caesio xanthonotus Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 203. Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 207.

D. X. 14. A. III. 11 (12). P. 2. 17—18. V. I. 5. Ll. 60—61. Ltr. $\begin{array}{c} 6 \\ \hline 1 \\ \hline 16\text{—}17 \end{array}$.

Dorsal and ventral profile evenly convex from snout to caudal peduncle. Height 2.9—3.2, 3.6—4.2 in length with caudal. Head 3.1, 3.9 in length with caudal. Eye 3.7—4.8, 1—1.2 in snout. Interorbital space very convex, less so in small specimens. Mouth very oblique, only slightly protractile. Maxillary truncate behind, reaching to below anterior half of eye. An outer series of enlarged teeth in the jaws, followed by a few rows of very small teeth. Two teeth of the outer row in the lower jaw near symphysis larger than the others. Vomer with a few minute teeth. In a small specimen also some teeth on palatines. Snout and region round eye naked. A scaly band on temporal region 2 or 3 scales deep, 9 or 10 scales long, the left and right one separated by a very narrow scaleless interspace. About 20 rows of scales between this band

and origin of dorsal. Opercular region scaly, with exception of the posterior and inferior preopercular limb. Origin of dorsal above that of ventrals. First dorsal spine minute, third longest and about equal to postorbital part of head. The dorsal decreases gradually in height posteriorly, the last ray as long as eye. Origin of anal below third dorsal ray. First anal spine minute, second one somewhat longer than third, slightly more than eye. Depth of anal decreasing slightly posteriorly, the last ray as long as eye. Pectorals long and pointed, more than half diameter of eye longer than head. Ventrals at equal distance from corner of mouth and origin of anal, or a little nearer to anal, as long as postorbital part of head. Caudal deeply forked, the lobes pointed. Least height of caudal peduncle 1.3—1.7 in its length, equal to snout. Colour of preserved specimen light reddish-brown above, white below, the two colours separated, on the sides by a very broad blackish or bluish band, more brownish on the head. Dorsal, anal and caudal pale reddish yellow, pectorals and ventrals pale yellowish. Axil of pectorals and a triangular spot at posterior part of base of pectorals dark blue. Length 306 mm.

Nomen indig.: Ekor kuning pisang (Malay, Batavia).

Habitat: Sumatra (Padang); Java (Batavia!); Celebes (Menado); Doworra Island; Buru; Ambon. — Annam, Solomon Islands.

In sea.

Note: Prof. Delsman informs us, that this species occurs rarely, together with the common *C. erythrogaster,* on the coral reefs in the bay of Batavia.

5. **Caesio pisang** Blkr.

Caesio pisang Bleeker, Nat. Tijdschr. Ned. Indië IV, 1853, p. 113. Arch. Neerl. Sci. Nat. VIII (1872), 1873, Révision Caesio, p. 168. Atl. Ichth. VIII, 1876—1877, p. 38.

Caesio pisang Günther, Cat. Brit. Mus. I, 1859, p. 391.

Caesio pisang Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, p. 38.

Caesio pisang Fowler, Bull. U S. Nat. Mus. Vol. XI, 1931, p. 209.

D. X. 15. A. III. 11 (12). P. 2. 18—19. V. I. 5. Ll. 68—73.

Ltr. $\begin{array}{c}7\\ \hline 1\\ \hline 15\end{array}$.

Elongate, fusiform. Height 3.9—4.1, 4.8—4.9 in length with caudal. Head 3.3—3.6, 4.1—4.4 in length with caudal. Eye 3—3.1, somewhat more than snout and equal to convex interorbital space. Mouth oblique, slightly protractile. Maxillary rounded behind, reaching to below frontborder of eye. Teeth in jaws conical, in a single series. No teeth on palate. Supra-temporal band of scales 3 or 4 scales deep, and about 7 scales long, those of both sides confluent in the middle, separated by a very narrow scaleless interspace from the 20 rows of scales behind it to origin of dorsal. Origin of dorsal slightly behind that of ventrals. First dorsal spine minute, fourth and fifth longest, equal to postorbital part of head. Dorsal decreasing in height posteriorly, last dorsal ray shorter than eye. Origin of anal below third dorsal ray. First anal spine minute, second and third subequal, longer than diameter of eye; last anal ray shorter than eye. Pectorals somewhat shorter than head. Ventrals at equal distance from corner of mouth and origin of anal, equal to postorbital part of head and half eye together. Caudal deeply forked, the lobes pointed. Least height of caudal peduncle 1.5 to almost twice in its length, equal to eye. Colour of preserved specimens reddish or violet above, silvery below. Each scale of the back with a bluish pearly spot, the spots forming more or less distinct longitudinal stripes. Fins yellowish, tips of caudal black. Length 150 mm (A specimen of Bleeker's collection in the Amsterdam Museum seen by us).

Nomen indig.: Pisang-pisang (Malay, Batavia).

Habitat: Java (Batavia); Borneo (Sitanki reef); Sidapan Island near Borneo; Sumatra (Padang); Celebes (Menado, Cape Kait; Labuandata Bay; Togian Bay; Buka Buka Island in Gulf of Tomini; Sadaa Island in Gulf of Boni); Saleyer!; Ternate; Maitara; Doworra Island; Tomahu Island; Ambon; Buru; South New Guinea. — Japan, Formosa, Philippines.

In sea.

6. **Caesio chrysozona** (K. v. H.) C.V.

Caesio chrysozona Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 440.
Caesio striatus Bleeker, Nat. en Geneesk. Arch. Ned. Indië I, 1845, p. 521 (nec Rüpp.).
Caesio chrysozona Bleeker, Verh. Bat. Gen. XXIII, 1850, Maen. p. 9.
Caesio chrysozona Günther, Cat. Brit. Mus. I, 1859, p. 392.
Caesio chrysozona Kner, Novara Exp. Fische I, 1865, p. 65.
Pristipomoides aurolineatus Day, Proc. Zool. Soc. London 1867, p. 937.
Caesio chrysozona var. *aurolineatus* Day, Fishes of India 1875—1888, p. 95.
Caesio chrysozona Bleeker, Arch. Neerl. Sc. Nat. VIII (1872), 1873, Révision Caesio, p. 173. Atl. Ichth. VIII, 1876—1877, p. 39.
Caesio chrysozona Macleay, Proc. Linn. Soc. New S. Wales VIII, 1883, p. 262.
Caesio chrysozona Snyder, Proc. U. S. Nat. Mus. XLII, 1912, p. 499.
Caesio chrysozona Ogilby, Mem. Queensland Mus. V, 1916, p. 182.
Caesio coerulaureus Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, p. 37 (nec Lac.).

Caesio chrysozona Jordan & Hubbs, Mem. Carnegie Mus. X, 1922—1925, p. 239.

Caesio chrysozona Mc Culloch, Checklist Fish Austr. Mem. Austr. Mus. V, Prt. II, 1929, p. 202.

Caesio chrysozonus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 212.

Caesio chrysosoma aurolineatus Borodin, Vanderbilt marine Mus. I. Art. 3, 1932, p. 83 (errore).

D. X. 15. A. III. 12. P. 2. 17—19. V. I. 5. Ll. 67—77. Ltr. $\begin{array}{c} 8 \\ \hline 1 \\ \hline 16\text{—}17 \end{array}$.

Elongate. Dorsal and ventral profile gently curved from snout to tail. Height 3.4—3.7, 4.3—4.7 in length with caudal. Head 3.1—3.6, 4—4.6 in length with caudal. Eye 3.5—4, equal to or somewhat more than snout and 1.2 in convex interorbital space. Mouth oblique, maxillary reaching to below frontborder of eye or somewhat further back. One row of teeth in sides of upper jaw; in the lower jaw two or three rows of very small teeth in its anterior part, one row laterally. No teeth on palate. In older specimens only a few teeth remain. Supra-temporal bands of scales about 9 scales long, 3—5 scales deep, confluent in the middle. Origin of dorsal behind base of pectorals. First dorsal spine minute, third longest, equal to postorbital part of head or somewhat shorter; last dorsal ray slightly less than eye, the height of the fin gradually decreasing posteriorly. First anal spine minute, second and third subequal, slightly less than eye; last ray about equal to half diameter of eye. Pectorals pointed, slightly less than head. Ventrals equal to postorbital part of head, their origin at equal distance between origin of anal and frontborder of eye. Caudal deeply forked, the lobes pointed. Least height of caudal peduncle 1.5 in its length, equal to eye. Colour of preserved specimens reddish-brown or bluish above, silvery below. A light band from upper margin of eye to base of caudal, running immediately below lateral line on body and immediately above it on tail. Dorsal, anal and caudal with a reddish-brown hue, tips of caudal black. Pectorals and ventrals yellowish. Length 240 mm (A specimen of Bleeker's collection in the Amsterdam Museum seen by us).

Nomen indig.: Pisang-pisang (Malay, Batavia).

Habitat:Singapore!; Nias; Java (Batavia!, Bantam); Duizend Islands!; Bawean; Celebes (Makassar!, Bonthain, Badjoa); Flores; Ternate; Ambon; Banda; New Guinea. — From Red Sea, seas of India, Annam, Japan, Riu-Kiu Islands, Formosa, Philippines, Malacca!, eastwards to Solomon Islands.

In sea.

7. **Caesio diagramma** Blkr. (Fig. 64. p. 295)

Caesio diagramma Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 180. Arch. Neerl. Sc. Nat. VIII (1872), 1873, Révision Caesio, p. 175. Atl. Ichth. VIII, 1876—1877, p. 40.
Caesio diagramma M. Weber, Jenaische Denkschr. VIII, 1895, p. 103, Siboga Exp. Fische, 1913, p, 285.
Caesio diagramma Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 219.

D. X. 14—15. A. III. 12. P. 2. 19. V. I. 5. Ll. 73—78. Ltr. $\begin{array}{c}9\\\hline 1\\\hline 16-18\end{array}$.

Elongate, dorsal and ventral profile gently curved from snout to tail. Height 3.3—3.7, 4.2—4.5 in length with caudal. Head 3.6—3.7, 4.4—4.6 in length with caudal. Eye 2.8—4.3, equal to snout or slightly more or less than snout. Interorbital space convex, less so in small specimens, somewhat more than eye. Mouth oblique. Maxillary reaching to below anterior border of eye or somewhat further back. Teeth in the small type-specimen minute, in two large specimens a single row of moderate conical teeth in both jaws. Two teeth near symphysis of lower jaw somewhat stouter. No teeth on palate, but in one specimen from Lombok we find a few teeth on vomer and on palatines. Supra-temporal band 12—13 scales long, 3 scales deep laterally, 7 scales deep where the bands are confluent in the median line of the nape. Origin of dorsal behind that of pectorals. First dorsal spine small. Third or fourth spines longest, slightly less than postorbital part of head; the last dorsal ray equal to eye, the dorsal decreasing in height posteriorly. Origin of anal below second dorsal ray. First anal spine minute, second and third spines subequal, as long as eye. Last anal ray less than eye. Pectorals pointed, as long as head. Ventrals equal to or somewhat more than postorbital part of head; their origin slightly nearer front-border of eye than to origin of anal. Caudal deeply forked, the lobes pointed. Least height of caudal peduncle 1.6—1.7 in its length, about equal to eye. Colour of type-specimen, 93 mm long, brownish above, silvery below. Two narrow brown longitudinal bands, bordered above and below by a faint lighter stripe. The upper band runs from nape to end of dorsal, the second one from head, below and close to lateral line to upper half of caudal peduncle, crossing the lateral line near tail. Tips of caudal darkish. In a specimen of 227 mm the upperparts are violet, the lower side silvery. The bands, described above, are whitish, bordered by faint dark stripes. Fins yellowish, caudal lobes with broad dark brown tips. Axil of pectorals black. Symphysial part of premaxilla, including the skin covering the peduncle of that bone, dark-violet, as well as chin. A specimen of 232 mm from Batavia has the same colouring, but the bands are very faint. Length 232 mm (Type of species in Leiden Museum seen by us).

Habitat: Singapore!; Java (Batavia!); Lombok!; Celebes (Makassar!); Ambon! — Philippines.

In sea.

Note. As has been remarked by one of us (Fische Siboga Exp.) the mouth of this species is not much more protractile than in others of the genus, as mentioned by Bleeker. Also the scaly sheath of dorsal and anal is not much less developed than usually and the Ll., which Bleeker gives as 80, is only 73 in the type-specimen.

This species is closely allied to *C. chrysozona,* differing by having one scale more between the lateral line and the median dorsal spines, and in the presence of a second lateral band. It seems to be restricted to the Indo-australian Archipelago and the Philippines.

8. **Caesio coerulaureus** Lac.

Caesio coerulaureus Lacépède, Hist. Nat. Poissons III, 1802, p. 85, 86.
Smaris mauritianus Quoy & Gaimard, Voyage de l'Uranie et de la Physicienne, Zool. 1824, p. 290.
Caesio coerulaureus Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 434.
Caesio maculatus Cuvier & Valenciennes, ibid, p. 439.
Caesio coerulaureus Bleeker, Verh. Bat. Gen. XXIII, 1850, Maen. p. 8.
Caesio caerulaureus var. Cantor, Journ. Asiat. Soc. Bengal XVIII, 1850, p. 1036.
Caesio maculatus Günther, Cat. Brit. Mus. I, 1859, p. 391.
Caesio caerulaureus Günther, ibid, p. 392.
Caesio coerulaureus Kner, Novara Exp. Fische I, 1865, p. 65.
Caesio caerulaureus Playfair, Fishes of Zanzibar, 1866, p. 32.
Caesio maculatus Playfair, Proc. Zool. Soc. London 1867, p. 852.
Caesio coerulaureus Klunzinger, Verh. zool. bot. Gesellsch. Wien XX, 1870, p. 770.
Caesio coerulaureus Bleeker, Arch. Neerl. Sci. Nat. VIII (1872), 1873, Révision Caesio, p. 171. Atl. Ichth. VIII, 1876—1877, p. 38.
Caesio maculatus Bleeker, Atl. Ichth. VIII, 1876—1877, p. 38.
Caesio coerulaureus Klunzinger, Fische des rothen Meeres I, 1884, p. 46.
Caesio caerulaureus Sauvage, Poissons de Madagascar, 1891, p. 170.
Caesio maculatus de Beaufort, Bijdr. Dierk. Afl. 19, 1913, p. 122.
Caesio maculatus M. Weber, Siboga Exp. Fische, 1913, p. 285.
Caesio caerulaureus Ogilby, Mem. Queensl. Mus. I, 1913, p. 92.
Caesio maculatus Chabanaud, Bull. Soc. Zool. France L, 1925, p. 151.
Caesio coerulaureus Barnard, Ann. S. Afr. Mus. XXI, 1925—1927, p. 650.
Caesio caerulaureus Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 204. Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 213.

D. X. 14—15. A. III. 11—12. P. 2. 19. V. I. 5. Ll. 65—70. Ltr. $\frac{7\frac{1}{2}-8}{\frac{1}{15-16}}$.

Fusiform. Dorsal and ventral profile evenly curved from snout to caudal peduncle. Height 3.4—3.5, 4.2—4.5 in length with caudal. In a large specimen of 283 mm length these figures are 2.9 and 3.8. Head 3.1—3.5, 3.8—4.4 in length with caudal. Eye 3.3—4, equal to or slightly shorter or longer than snout; equal to or, in large specimens, 1.4 in convex interorbital space. Mouth oblique, maxillary reaching to below frontborder of eye. Jaws somewhat protractile. A single series of small or moderate conical teeth in the jaws, sometimes with a few minute teeth behind it. No teeth on palate. Supra-temporal bands of scales 10 to 12 scales long, 3 scales deep, separated in the middle by a narrower or broader interspace or almost confluent. Origin of dorsal behind origin of pectorals. First dorsal spine minute, second shorter than third and fourth, which are subequal and as long as snout and eye together. Dorsal decreasing in height posteriorly, last dorsal ray as long as eye. Origin of anal below second dorsal ray. First anal spine minute, second and third subequal, somewhat more than eye. Last anal ray somewhat less than eye. Pectorals slightly shorter than head. Ventrals at equal distance between origin of anal and middle of eye, equal to or one third of eye more than postorbital part of head. Caudal deeply forked, the lobes pointed. Least height of caudal peduncle 1.2 in its length, slightly more than eye. Colour of preserved specimens reddish-brown or bluish above, silvery below. Traces of a yellowish band, running from nape to base of upper caudal lobe often present. In very large specimens we find traces of several light longitudinal bands more, on the back and on the sides, parallel to the first-mentioned band. Fins yellowish. Each caudal lobe with a broad dark longitudinal band. Dorsal with an indistinct dark margin. Axil of pectorals deep bluish-black; base of pectorals with a similar dark triangular patch, seldom wanting. Length 283 mm.

Nomen indig.: Pisang-pisang (Malay, Batavia), Bawang (Balikpapan).

Habitat: Singapore!; Pulu Weh!; Sumatra (Telokbetong, Padang); Batu Islands; Nias!; Biliton!; Java (Batavia); Borneo (Balikpapan!); Sidapan Island, Si Amil Island, Tomahu Island and Bumbum Island near Borneo; Bali; Lombok!; Kangeang!; Celebes (Makassar!; Badjoa, Menado, Basa reef, Cape Kait);

Dodepo and Pasajogo Islands in Gulf of Tomini; Limbe Strait; Tanakeke Island; Saleyer!; Tukang besi Islands!; Halmahera; Gomomo Island in Pitt Passage; Ternate; Tidore; Batjan; Buru; Ceram; Ambon!; Banda!; Solor; Waigeu!; South New Guinea. — Coast of Natal, Mossambique, Madagascar, Seychelles, Zanzibar, Red Sea, Ceylon, Japan, China, Riu-Kiu Islands, Philippines, North Australia, New Britain, Solomon Islands, New Hebrides, Samoa, St. Cruz Islands.

In sea.

Note: Chabanaud, who has re-examined the type of *Caesio maculatus,* says (l.c.) that there are no differences other than of colour between it and *C. coerulaureus.* Fowler (1931) comes to the same conclusion. Although we have separated them in former papers, we have united them now.

Sauvage (l.c.) mentions teeth on the vomer in this species. We have not found them in our material, but as we know that teeth on the palate occur occasionally in other species of *Caesio,* which as a rule have the palate toothless, there is no reason to mistrust Sauvage's statement.

4. **Symphysanodon** Bleeker

(Bleeker, Arch. Neerl. Sc. Nat. XIII, 1878, p. 60)

Propoma Günther, Challenger Rep. Shore Fishes, 1880, p. 39.
Rhyacanthias Jordan, Proc. U. S. Nat. Mus. LIX, 1921, p. 647.

Elongate, compressed. Scales ctenoid, moderate. Lateral line complete, straight. Head scaled above, on the sides and below scales reaching to front of snout, where they are smaller. Maxillary and mandible also scaled. Preoperculum denticulate. Operculum with two flat spines. Mouth rather large, slightly oblique. Lower jaw with a symphysial knob, fitting into a notch between the rami of the premaxillae. Base of lower jaw with a prominent angular basal elevation. Small even teeth in several rows in the jaws, those on symphysial knob and angular elevation of lower jaw as well as those on knob of upper jaw, on each side of the median notch, somewhat larger. Palate edentulous or a few vestigial ones on vomer. Eye large. Suborbital extremely narrow, the end of the maxillary nearly touching the eye. Seven branchiostegals. One continuous dorsal, consisting of IX feeble spines and 9 or 10 soft rays. Anal with III spines and 7 soft rays. Pectorals and ventrals pointed, the last below origin of the first. Caudal deeply forked, the lobes pointed and more or less produced into filaments.

Dorsal and anal fins scaleless, but with a very low scaly sheath. An axillary process at base of ventrals present. Pseudobranchiae present.

Distribution: That of the single species known.

Note: The presence of an axillary process is against the opinion of Jordan, that this genus belongs to the Anthiinae.

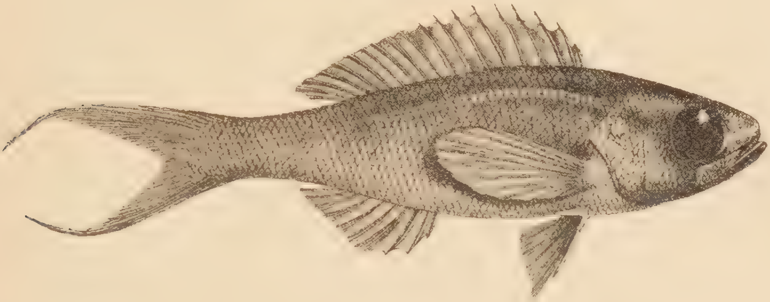

Fig. 65. *Symphysanodon typus* Blkr. (after Günther)

1. **Symphysanodon typus** Blkr. (Fig. 65. p. 309)

Symphysanodon typus Bleeker, Arch. Neerl. Sci. Nat. XIII, 1878, p. 61.
Propoma roseum Günther, Challenger Rep. Shore Fishes, 1880, p. 39.
Rhyacanthias carlsmithi Jordan, Proc. U. S. Nat. Mus. LIX, 1921, p. 647.
Symphysanodon typus Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 186.

D. IX. 9—10. A. III. 7. P. 2. 10. 4. V. I. 5. Ll. 50—60. Ltr. $\begin{array}{c}4-5\\ \hline 1\\ 11\end{array}$.

Height 3.6—3.7. Head 3.3. Eye, much longer than snout. Interorbital space two thirds of eye. Maxillary reaching to below middle of eye or nearly so. Denticulations at corner of preoperculum larger than the others. Dorsal spines, with exception of the anterior ones, which are shorter, of about equal length; the soft part of dorsal scarcely higher than the spinous part, pointed behind. Third anal spine longest, the first soft ray of anal scarcely longer than the third spine. Anterior part of soft anal deeper than posterior part. Caudal apparently relatively longer and with longer filaments in large specimens. Length 210 mm (Compiled, not seen by us).

Habitat: Off Kei Islands, 129 fathoms; New Guinea. — Hawaii.

In sea, probably living in deep water only.

Note: We have followed Fowler in uniting the three species mentioned above. It may however be possible, that Günther's species is not the same as that of Bleeker, as Günther counted 60 scales in the lateral line and 5 scales above it, wheras Bleeker mentions circa 50 scales and 4 scales in the Ltr.

5. **Aprion** Cuvier & Valenciennes

(Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 543)

Chaetopterus Schlegel, Fauna Japonica, Poissons, 1844, p. 78 (preoccupied).
Pristipomoides Bleeker, Nat. Tijdschr. Ned. Indië III, 1852, p. 575.
Sparopsis Kner, Sitzber. Akad. Wien LVIII, 1868, p. 27.
Bowersia Jordan & Evermann, Bull. U. S. Fish Comm. XXII (1902), 1903, p. 182.
Ulaula Jordan & Thompson, Proc. U. S. Nat. Mus. XXXIX, 1911, p. 459.

Body compressed, elongate, or oblong, covered with moderate or rather small ctenoid scales, which may loose their ciliation in old specimens. Lateral line continuous, gently curved. Anterior part of head naked. Preoperculum, operculum and interoperculum with several, regularly arranged rows of scales. Preopercular limb broadly naked. Scales on occiput beginning behind eyes with a well-defined supra-temporal patch or band of scales, well separated by a narrow scaleless interspace from the scales behind. Preoperculum denticulate behind, smooth in large specimens. Operculum with two flat spines. Mouth large, moderately protractile. Teeth in the jaws in bands, with smaller or larger distant canines in an outer series. Teeth on vomer and palatines. One single dorsal consisting of X slender spines and 10 or 11 rays. Anal with III moderate spines and 8 rays. Last ray of dorsal and of anal extended. Dorsal and anal scaleless, caudal scaled at base. Pectorals long and pointed or short and more rounded. Ventrals long, pointed. An axillary

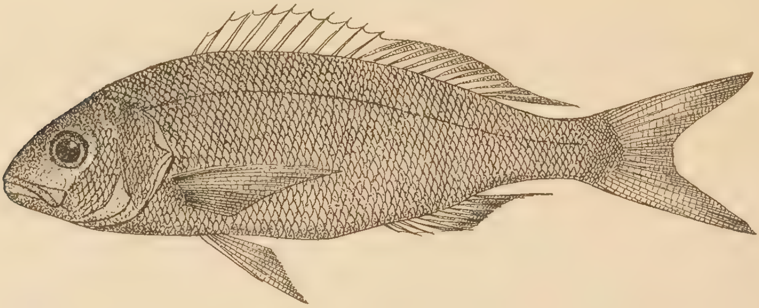
Fig. 66. *Aprion microlepis* (Blkr.). × $^1/_3$

process present, long and pointed or small. Caudal forked. Pseudobranchiae present.

Distribution: Tropical and subtropical parts of Indic and Pacific. One species West Atlantic.

Key to the Indo-australian species of Aprion

1. Pectorals short and rounded, equal to snout (Subgenus *Aprion*) . . . . 1. *A.* (*A*) *virescens* p. 311.
2. Pectorals long and pointed, nearly equal to length of head (Subgenus *Pristipomoides*).
   - *a.* Ll. 60—68. Ltr. $\begin{array}{c}6\frac{1}{2}\\ \hline 1\\ \hline 18-19\end{array}$ . . . . 2. *A.* (*P.*) *microlepis* p. 312.
   - *b.* Ll. 51. Ltr. $\begin{array}{c}5\frac{1}{2}-6\\ \hline 1\\ \hline 13\end{array}$ . . . . 3. *A.* (*P.*) *typus* p. 313.

1. **Aprion (Aprion) virescens** C.V.

Aprion virescens Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 544.
Mesoprion microchir Bleeker, Nat. Tijdschr. Ned. Indië V, 1853, p. 332.
Lutjanus microchir Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 233.
Aprion virescens Playfair, Proc. Zool. Soc. London, 1867, p. 846.
Sparopsis latifrons Kner, Sitzber. Akad. Wien LVIII, 1868, p. 27.
Sparopsis elongatus Kner, ibid. p. 303.
Chaetopterus microchir Bleeker, Versl. Akad. Amsterdam (2) III, 1869, p. 85.
Aprion virescens Günther, Fische der Südsee I, 1873, p. 16.
Aprion (Aprion) virescens Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873, Révision Lutjanus, p. 92. Atl. Ichth. VIII, 1876—1877, p. 77.
Aprion virescens Steindachner, Denkschr. Math. Nat. Cl. Akad. Wien LXX, 1900, p. 484.
Aprion virescens Jenkins, Bull. U.S. Fish Comm. XXII (1902), 1904, p. 452.
Aprion virescens Snyder, ibid. p. 527.
Aprion virescens Jordan & Evermann, ibid. XXIII (1903), 1905, p. 239.
Aprion virescens M. Weber, Siboga Exp. Fische, 1913, p. 257.
Aprion virescens Mc Culloch, Biol. Results „Endeavour" III, 1915, p. 143.
Aprion virescens Jordan & Starks, Ann. Carnegie Mus. XI, Nos. 3—4, 1917, p. 450.
Aprion virescens Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 193.
Aprion virescens Mc Culloch, Checklist Fish Austr. Mem. Austr. Mus. V, Prt. II, 1929, p. 202.
Aprion virescens Fowler, Bull. U.S. Nat. Mus. Vol. XI, 1931, p. 185.

D. X. 11. A. III. 8. P. 2. 15—16. V. I. 5. Ll. 49. Ltr. $\begin{array}{c}6\frac{1}{2}\\ \hline 1\\ \hline 18\end{array}$.

Height 4, 4.9 in length with caudal. Head 3.2, 4 in length with caudal. Eye 4.9, 2.2 in snout and 1.8 in flat interorbital space.

Mouth oblique; Maxillary not quite reaching to below frontborder of eye. Teeth in jaws in villiform bands, the outer series enlarged. Two strong canines in frontpart of upper and lower jaw, besides some smaller ones on the sides of both jaws, specially of the lower jaw and in the space between the large canines in the upper jaw. Teeth on vomer in a curved patch, on palatines in an elongate, ovate patch. Scales on head beginning immediately behind eyes with an elongate band of about 4 rows of scales, widely separated from that of the other side and by a narrow scaleless region from the scales behind it. Seven to eight transverse rows of scales on preoperculum, the posterior and inferior limb of which is broadly naked. Preopercular hindborder and lower border smooth, at least in adults. Dorsal spines slender and flexible. First spine half length of second; second to seventh subequal and longest, shorter than postorbital part of head. Following spines slightly shorter, somewhat longer than anterior rays, which increase in length posteriorly, the last one being the longest and about as long as longest spine; hence the dorsal is pointed behind. Anal spines flexible, the first minute, the third longest and about equal to horizontal diameter of eye; the anterior anal rays somewhat longer than third spine, the last ray much longer, as long as postorbital part of head. Anal pointed behind as dorsal. Pectorals short and rounded, equal to snout. Ventrals one third diameter of eye longer. Ventral spine equal to postorbital part of head. Caudal deeply forked, the lobes pointed. Least height of caudal peduncle 1.9 in its length. Colour of preserved specimen light reddish-brown on back, lighter on sides and below. Many of the scales with a darker base. An indistinct longitudinal reddish streak on operculum. Vertical fins light reddish-brown, a series of dark violet blotches at the base of the membrane between the last five dorsal spines and the anterior dorsal rays. Pectorals and ventrals yellowish, lastnamed darkbrown or leaden-colour at tip. Length 720 mm.

Habitat: Celebes (Makassar); Sulu Islands!; Ternate; Ambon. — Mauritius, Seychelles, Ceylon, Okinawa, Philippines, Queensland, Fiji, Hawaiian Islands, Paumotu Archipelago.
In sea.

2. **Aprion** (**Pristipomoides**) **microlepis** (Blkr.) (Fig. 66. p. 310)

Chaetopterus microlepis Bleeker, Versl. Akad. Amsterdam (2) III, 1869, p. 80.

Aprion (Aprion) microlepis Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873, Révision Lutjanus, p. 94. Atl. Ichth. VIII, 1876—1877, p. 78.

Etelis brevirostris Vaillant, Bull. Soc. Philom. Paris (6) X, 1873, p. 15.
Etelis brevirostris Sauvage, Poissons de Madagascar, 1891, p. 109.
Aprion microlepis Fowler, Proc. Acad. Nat. Sci. Philadelphia 1900, p. 502.
Aprion microlepis M. Weber, Siboga Exp. Fische, 1913, p. 257.
Pristipomoides microlepis Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 192. Bull. U.S. Nat. Mus. Vol. XI, 1931, p. 190.

D. X. 11. A. III. 8. P. 2. 14. V. I. 5. Ll. 60—68. Ltr. $\begin{array}{c}6\frac{1}{2}\\ \hline 1\\ \hline 18-19\end{array}$.

Height 3.1—3.6, 3.8—4.5 in length with caudal. Head 3.1, 3.8 in length with caudal. Eye 3.1—4.3, 1.4 in snout and in slightly convex interorbital space. Mouth oblique. Maxillary reaching to below frontborder of pupil. Small pointed teeth in a narrow band in the jaws, with an inner row of enlarged ones and an outer row of distant caninoid ones. Teeth on vomer in a triangular patch, on palatines in an elongate ovate patch. Scales on occiput beginning with a supra-temporal patch of scales broadly separated from each other and from scales behind by a narrow scaleless area. Seven transverse rows of scales on preoperculum. Posterior and inferior preopercular limb broadly naked. Hind and lower border of preoperculum finely serrated, the serrations at the angle somewhat coarser. Dorsal spines slender and flexible, but pungent. First spine about half as long as second. Fourth to seventh spines subequal and somewhat longer than the others, as long as snout. Soft dorsal somewhat lower than spinous part, acutely pointed behind, the last dorsal ray being much longer than the others. Anal spines slender and pungent; the first less than half length of second, which is as long as third and slightly less than diameter of eye. Soft anal deeper than spinous part, pointed behind as the dorsal, the last ray much longer than the others. Pectorals long and acutely pointed, nearly equal to length of head. Ventrals pointed, more than head without snout. Ventral spine equal to postorbital part of head. Caudal forked. Least height of caudal peduncle 1.8 in its length. Colour of preserved specimens light reddish-brown, with silvery reflections; border of scales darker, giving a reticulate appearance. Upper part of head and snout darker. Fins very light reddish-brown. Length 300 mm.

Habitat: Sulu!; Ambon; Banda! — Bourbon, Philippines, Hawaiian Islands.

In sea.

3. **Aprion** (**Pristipomoides**) **typus** (Blkr.)

? *Serranus argyrogrammicus* Cuvier & Valenciennes, Hist. Nat. Poissons VIII, 1831, p. 183.

Pristipomoides typus Bleeker, Nat. Tijdschr. Ned. Indië III, 1852, p. 575.
Dentex pristipoma Bleeker, ibid. VII, 1854, p. 246.
Mesoprion dentex Bleeker, Act. Soc. Indo-Neerl. VI, 1859, p. 20.
Lutjanus dentex Bleeker, Ned. Tijdschr. Dierk. I, 1865, p. 282.
Chaetopterus pristipoma Bleeker, Versl. Akad. Amsterdam (2) III, 1869, p. 83.
Mesoprion multidens Day, Proc. Zool. Soc. London 1870, p. 680.
Anthias multidens Day, Fishes of India 1875—1888, p. 27.
Aprion (Aprion) pristipoma Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873, Révision Lutjanus, p. 96. Atl. Ichth. VIII, 1876—1877, p. 79.
Centropristis (Aprion) pristipoma Klunzinger, Fische des rothen Meeres I, 1884, p. 16.
Aprion pristipoma Day, Fauna Brit. India, Fishes I, 1889, p. 533.
? *Etelis argyrogrammicus* Sauvage, Poissons de Madagascar 1891, p. 107.
Aprion typus Fowler, Journ. Acad. Nat. Sci. Philadelphia (2) XII, 1904, p. 527.
Pristipomoides typus Fowler, Proc. Acad. Nat. Sci. Philadelphia 1929, p. 634.
Pristipomoides argyrogrammicus Fowler, Bull. U.S. Nat. Mus. Vol. XI, 1931, p. 189 (nec C.V.?).

D. X. 11. A. III. 8. P. 2. 14. V. I. 5. Ll. 51. Ltr. $\dfrac{5\frac{1}{2}—6}{\dfrac{1}{13}}$.

Height 2.9—3.3, 4.4—4.7 in length with caudal. Head 3, 4.3—4.5 in length with caudal. Eye 3.5—3.6, somewhat less than snout and somewhat more than interorbital space. Mouth slightly oblique. Maxillary reaching almost to below frontborder of pupil or below middle of eye. Narrow villiform bands of small, curved, pointed teeth in the jaws, tapering on the sides, with an outer row of distant canines; the anterior ones, specially in the upper jaw, longer and more hooked than the others. Teeth on vomer in a sharply bent band or in an almost triangular patch; on palate in a long narrow band. Scales beginning on head above posterior part of eyes with a scaly patch, widely separated from that of the other side and from the scales behind. Six transverse rows of scales on preoperculum. Broad posterior and inferior preopercular limb naked. Hind- and lower border of preoperculum finely dentate, coarser at the projecting angle. Dorsal spines moderate. First spine about half length of second; fifth longest, equal to postorbital part of head. Last dorsal ray produced, as long as snout and half eye together. First anal spine equal to half length of second, which is as strong and as long as third and equal to horizontal diameter of eye. Last anal ray produced, slightly shorter than last dorsal ray. Pectorals pointed, as long as head. Ventrals more than head without snout. Caudal deeply forked, the lobes pointed, the upper one filamentous. Least height of caudal peduncle 1.6 in its length. Coloration uniform. Length over 290 mm (Type seen by us in the Leiden Museum).

Habitat: Sumatra (Siboga!, Padang); Celebes; Ambon; Mysore; New Guinea. — Madagascar, Red Sea, Coast of British India, Ceylon, Andamans.

In sea.

Note. We have examined in Leiden both specimens, on which Bleeker made the first description of this species. The largest one, of 293 mm, is the one figured in the Atlas Ichth. It has a more pointed snout and the body more elongate than the second, smaller specimen of 275 mm, but both specimens agree in all other respects. Fowler (l.c.) united *Pristipomoides* typus Blkr. with *Serranus argyrogrammicus* C.V., basing this synonymy chiefly on the description and the figure given by Sauvage (l.c.). This description, as well as that of Cuvier & Valenciennes, are both too short — nothing f.i. is said about the dentition —, to make this sure. Moreover, the description of the coloration given by the first authors must be based on a quite different species than that of Bleeker. It greatly suggests that it is based on a specimen of *Serranus zonatus* C.V. Cuvier & Valenciennes describe it already as "un serran, qui a tout-à-fait la tournure du serran à bandes" and Günther (Cat. Brit. Mus. I, 1859, p. 503) has united both, although with a querry, under the name of *Anthias zonatus*. As long as the type of Cuvier & Valenciennes has not been better re-examined, we think it safer to retain Bleeker's name for this species.

Doubtful species

Pristipomoides Sp. aff. typus Duncker, Mitt. Naturhist. Mus. Hamburg XXI, 1904, p. 150.

Differs from *A. typus* according to Duncker by having D. X. 15. A. III. 10. Ll. 55—60. A black axillary blotch.

Habitat: Singapore.

We doubt if this species belongs to the genus *Aprion (Pristipomoides)*, but with the few data available, it is impossible to say more.

6. **Gymnocaesio** Bleeker

(Bleeker, Versl. Akad. Amsterdam (2) IX, 1876, p. 152)

Body elongate, somewhat rounded, covered with small ctenoid scales. Lateral line continuous, almost straight. Head pointed. Snout, maxillary, region round eye and lower and posterior preopercular limb naked. The scales begin on upper part of head above middle of eyes with a supratemporal band of scales, well separated by a narrow interspace from the scales of the back, and joined to that of the other side anteriorly. Preoperculum entire. Operculum with a single flexible flat spine. Eye with an adipose eyelid. Mouth moderate, somewhat protractile, lips thin. A few minute pointed teeth in the lower jaw near symphysis. Upper jaw and palate toothless. One single dorsal consisting of IX homacanth, rather feeble spines and 15 soft rays; the first spine more than half length of second, which is equal to the third. The following spines decrease gradually in size. Origin of dorsal midway between that of pectorals and ventrals. Pectorals moderately rounded. Ventrals with a slender spine and 5 branched rays. Anal with III spines; the first of which is minute, and 12 soft rays. Dorsal and anal without scaly sheath. Caudal forked. Six branchiostegals. Pseudobranchiae present.

Distribution: that of the single species known.

1. **Gymnocaesio gymnopterus** (Blkr.) (Fig. 67)

Caesio gymnopterus Bleeker, Nat. Tijdschr. Ned. Indië X, 1856, p. 372.
Smaris gymnopterus Bleeker, Arch. Neerl. Sc. Nat. VIII (1872), 1873, p. 181.
Gymnocaesio gymnopterus Bleeker, Versl. Akad. Amsterdam (2) IX, 1876, p. 152, Atl. Ichth. VIII, 1876—1877, p. 34.

D. IX. 15. A. III. 12. P. 2. 19. V. I. 5. Ll. 80—83. Ltr. $\begin{array}{c}7\\ \hline 1\\ \hline 13\end{array}$.

Height 5—5.5, 6—6.6 in length with caudal. Head 3.7—4, 4.4—4.7 in length with caudal. Eye 3.3—3.4, somewhat more than snout and about equal to slightly convex interorbital space. Mouth oblique, maxillary reaching to below frontborder of eye. Supratemporal band of scales about 4 scales deep and 11 scales long. Third dorsal spine equal to postorbital part of head and half eye together. Second and third anal spines subequal, somewhat more

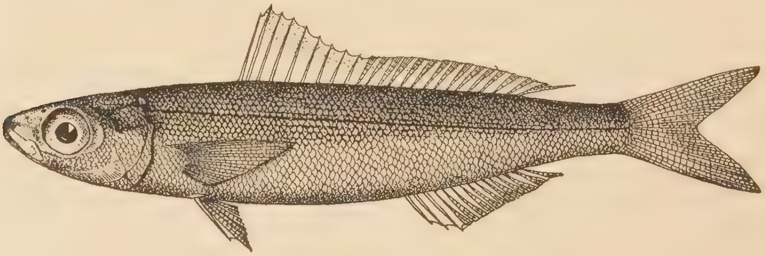

Fig. 67. *Gymnocaesio gymnopterus* (Blkr.) $\times {}^{10}/_{11}$

than snout. Pectorals equal to head without snout. Origin of ventrals equidistant from tip of snout and origin of anal. Ventrals equal to postorbital part of head. Colour of alcohol specimens darkbrown above, silvery below, each scale of upper part with a large lilac spot. Fins yellowish. Axil of pectoral black. Length 161 mm (Specimen of Bleeker's collection in the Amsterdam Museum seen by us).

Habitat: Flores; Ternate; Ambon!
In sea.

Note. Günther (Fische der Südsee I, 1873—1875, p. 33) suggested that *Caesio argenteus* (Bl.) might be the same as this species. Fowler (Mem. B. P. Bishop Mus. X, 1928, p. 204) thought this likely and afterwards (Bull. U.S. Nat. Mus. Vol. XI, 1931, p. 201) united them. The two species differ however widely in the number of scales (Ll. in *C. argenteus* according to Fowler (1928) 52 + 6, Ltr. 4/1/8 or (1931) Ll. 68—70, Ltr. 6/1/11—12. Moreover *C. argenteus* hat but X dorsal spines.

7. **Aphareus** Cuvier & Valenciennes

(Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 485)

Sacrestinus Jordan, Evermann & Tanaka, Proc. Calif. Acad. Sci. (4) XVI, 1927, p. 670.
Fares Jordan, Evermann & Tanaka, ibid. p. 673.
Humefordia Whitley, Austr. Zool. VI, Prt. IV, 1931, p. 334.

Body elongate, fusiform, covered with small feebly ctenoid scales. Lateral line continuous, almost straight. Head pointed. Lower jaw strong, chin prominent. Snout, jaws, preorbital and suborbital and greater part of interorbital space naked. Opercular region scaled. Posterior and inferior preopercular limb broadly scaleless. Hindborder of preoperculum denticulate in young specimens, rugose in old ones. Scales beginning on occiput with a rounded patch above posterior part of eye, the patches of each side broadly separated from each other by a median prolongation of the scales of the back, tapering somewhat anteriorly and not reaching further forward on head than the lateral patches, which are separated from it by a narrow scaleless interspace. Eye large. Mouth large, oblique. Minute teeth in several rows in the jaws anteriorly, in a single row posteriorly. Palate toothless. One single dorsal consisting of X rather weak spines and 11 rays, the last of which is well extended. Anal with III slender spines and 8 rays, the last of which is well extended as that of the dorsal, Pectorals long and falciform, the lower rays extended with age. Ventrals pointed, consisting of a spine and five branched rays. Caudal deeply forked, the lobes long and pointed. Dorsal and anal without scaly sheath, a few series of elongate crowded scales at base of dorsal only (not counted in the linea transversalis in the description of the species). Seven branchiostegals.

Distribution: Two closely related species in warm parts of Indic and Pacific.

Key to the Indo-australian species of Aphareus

1. 16—18 gillrakers on lower branch of first branchial arch . . . . 1. *A. furcatus* p. 318.
2. 30—33 gillrakers on lower branch of first arch . . 2. *A. rutilans* p. 319.

1. **Aphareus furcatus** (Lac.)

Labrus furcatus Lacépède, Hist. Nat. Poissons III, 1802, p. 429, 447.
Caranxomorus sacrestinus Lacépède, ibid. V, 1803, p. 681, 682.
Aphareus caerulescens Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 487.
Aphareus furcatus Günther, Fische der Südsee I, 1873—1875, p. 17.
Aphareus furcatus Jordan & Starks, Proc. U.S. Nat. Mus. XXIII, 1901, p. 719.
Aphareus flavivultus Jenkins, Bull. U.S. Fish Comm. XIX (1899), 1901, p. 390, Ibid. XXII (1902), 1904, p. 451.
Aphareus furcatus Jenkins, l.c.
Aphareus flavivultus Jordan & Evermann, Bull. U.S. Fish Comm. XXIII (1903), 1905, p. 235.
Aphareus furcatus Jordan & Thompson, Proc. U.S. Nat. Mus. XXXIX, 1911, p. 467.
Aphareus furcatus Jordan, Tanaka & Snyder, Journ. Coll. Sci. Univ. Tokyo, XXXIII, Art. 1, 1913, p. 165.
Aphareus furcatus Jordan & Starks, Ann. Carnegie Mus. XI, Nos. 3—4, 1917, p. 450.
Aphareus furcatus Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 194.
Aphareus furcatus Fowler, Bull. U.S. Nat. Mus. Vol. XI, 1931, p. 197.

D. X. 11. A. III. 8. P. 2. 14. V. I. 5. Ll. 68. Ltr. $\begin{array}{c}8\\\hline 1\\\hline 20\end{array}$.

Height 3.5, 4.5 in length with caudal. Head 3.1, 4 in length with caudal. Eye 4.6, 1.5 in snout and 1.4 in somewhat convex interorbital space. Mouth large, oblique. Chin prominent. Maxillary reaching almost to below hindborder of eye. About three rows of very small pointed teeth in jaws; in the outer row somewhat longer teeth. No teeth on palate. Scales beginning on head with a supratemporal patch of teeth, the right and the left one separated from each other by a median, triangular prolongation of the scaling of the back, directed forward and ending anteriorly above posterior part of eyes, wedged in between the two patches, which reach anteriorly as far as it. Eight transverse rows of scales on preoperculum, the posterior and inferior limb of which is naked and much so at the somewhat projecting angle. Hindborder of preoperculum rugose, 25 rows of scales before dorsal. Dorsal spines rather weak, flexible but pungent. First spine half length of second, which is somewhat shorter than third. Third spine longest, equal to postorbital part of head. Last spine somewhat more than eye, equal to first ray in length. Last dorsal ray extended, as long as snout and eye together. Anal spines slender, the first less than half length of second. Third spine longest, equal to snout. Anal rays somewhat shorter than third spine, but the last ray extended as that of the dorsal and as long as it. Pectorals pointed, falcate, less than half length of snout shorter than head. Ventrals slightly less than head without snout. Caudal deeply forked. Least height of caudal peduncle 1.6 in its length. 16—18 lanceolate gillrakers on lower branch of first arch, and 5 on upper branch. Colour of preserved specimen uniformly olive. Fins dusky. The dorsal with faint light yellowish round spots, bordered above with darker, at the base of the membrane between the spines. Length 348 mm.

Habitat: Pulu Weh!; Celebes (Kait Point); Talisse Island; Buru. — Réunion and Mauritius, Seychelles, Ceylon, Japan, Hawaiian Islands, Tahiti.

In sea.

Note. *A. furcatus* and *A. rutilans* have generally been united, till Fowler recently separated them on account of the difference in the number of gillrakers. The two names are applied by Fowler rather arbitrarily, as, as far as we know, the types of both species have not been examined on their gillrakers. In most cases it is not clear, from the literature, if *A. furcatus* or *A. rutilans* is meant, and the distribution of both species remains therefore uncertain.

2. **Aphareus rutilans** C.V. (Fig. 68. p. 320)

Aphareus rutilans Cuvier & Valenciennes, Hist .Nat. Poissons VI, 1830, p. 490.

Apharcus rutilans Rüppell, Neue Wirbelthiere, Fische 1835, p. 121.

Aphareus rutilans Klunzinger, Verh. zool. bot. Gesellsch. Wien XX, 1870, p. 768. Fische des rothen Meeres I, 1884, p. 45.

Aphareus furcatus Bleeker, Atl. Ichth. VIII (1872), 1873, p. 80 (nec Lac.).

Aphareus rutilans Day, Fishes of India, Suppl. 1888, p. 782. Fauna of Br. India, Fishes I, 1889, p. 530.

Aphareus thompsoni Fowler, Occas. Papers B. P. Bishop Mus. VIII, 1923, p. 382.

Aphareus thompsoni Jordan, Proc. U.S. Nat. Mus. LXVI, 1925, Art. 33, p. 20.
Aphareus (Fares) rutilans Jordan, Evermann & Tanaka, Proc. Calif. Acad. Sci. (4) XVI, No. 20, 1927, p. 673.
Aphareus rutilans Fowler, Mem. B. P. Bishop Mus. X. 1928, p. 195. Bull. U.S. Nat. Mus. Vol. XI, 1931, p. 198.

D. X. 11. A. III. 8. P. 2. 14. V. I. 5. Ll. 68—72. Ltr. $\begin{array}{c}7\text{—}8\\ \hline 1\\ \hline 19\text{—}21\end{array}$.

Height 3.3—3.7, 4.3—4.9 in length with caudal. Head 3—3.1, 4—4.2 in length with caudal. Eye 4.1—4.4, 1.2—1.5 in snout and slightly more than nearly flat interorbital space. Mouth large, oblique. Chin prominent. Maxillary reaching to below hindborder of pupil or nearly to below hindborder of eye. A few rows of small teeth anteriorly in the upper jaw, one row in lower jaw and on sides of upper jaw. No teeth on palate. Scales beginning on head above posterior part of eyes with a median triangular prolongation, the point of which is directed forward, and wedged in between two supratemporal scaly patches. Eight transverse rows of scales on preoperculum, the posterior and inferior limb of which is naked. Hindborder of preoperculum denticulate in young, merely rough in older specimens. 23 scales before dorsal. Dorsal spines rather weak, flexible but pungent. First spine short. Third spine equal to postorbital part of head. Last dorsal ray extended, nearly equal to snout and eye together. First anal spine shorter than second. Third spine somewhat longer than second, nearly equal to horizontal diameter of eye. Last anal ray extended, as long as last dorsal ray. Pectorals pointed, falcate, less than half length of snout shorter than head. Ventrals equal to snout and eye together. Caudal deeply forked. Least height of caudal peduncle about twice in its length. 30—33 lanceolate gillrakers on lower branch of first

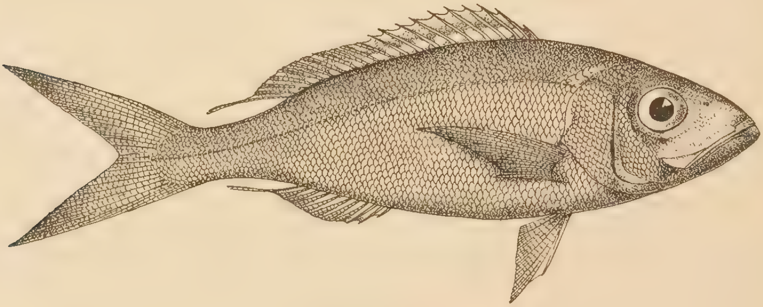

Fig. 68. *Aphareus rutilans* C.V. × 6/11

arch and 16—18 on upper branch. Colour of preserved specimens olive above, with a silvery hue, silvery on sides and below. Head bronze-coloured above, with silvery reflections on preopercular limb, jaws and suborbital. Fins hyaline. Length 370 mm.

Habitat: Celebes (Menado); Ambon!; New Guinea. — Madagascar!; Red Sea, Ceylon, Philippines, Hawaiian Islands. In sea.

Note. We examined in the Leiden Museum the 5 specimens described by Bleeker l.c. as *A. furcatus*. They all belong to *A. rutilans*, as described by Fowler. For the same reason as given under *A. furcatus*, the distribution of this species too is uncertain.

8. **Mirolabrichthys** Herre

(Herre, Philippine Journ. Sc. XXXII, 1927, p. 413)

Entonanthias Jordan & Tanaka, Ann. Carnegie Mus. XVII, 1927, p. 385.

Body moderately long, compressed, covered with moderate ctenoid scales, each with a small auxiliary basal scale. Lateral line continuous. Head moderate, compressed. Premaxillaries with or without a proboscislike, pointed, fleshy, conic papilla at their symphysis, only developed with age. Head scaly to tip of snout, maxillary also scaly. Scales of the head smaller than those of the body. Eye moderate, along hind edge with a row of small papillae. Mouth rather large; maxillary reaching below hind part of eye or beyond. Teeth in one or more series in the jaws; two pairs of

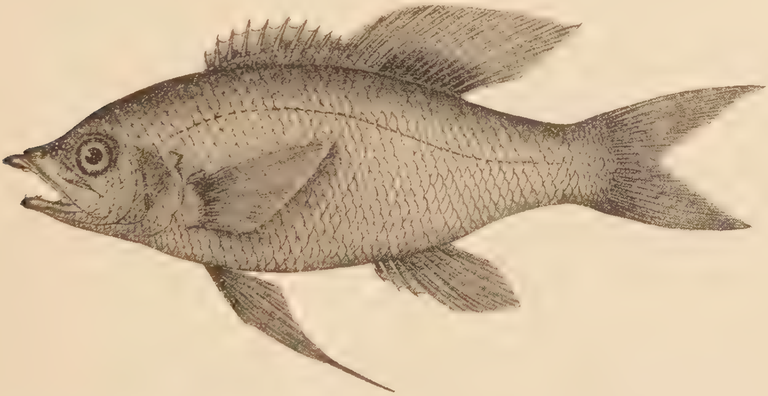

Fig. 69. *Mirolabrichthys tuka* Herre. After Herre

canines anteriorly also on each side below. Plate and tongue toothless. Gill-rakers lanceolate, rather fine. Dorsal fin deeply notched between spinous part and soft part, consisting of IX to XI spines and 14 to 16 soft rays. Anal with III spines and 7 soft rays. The dorsal and the anal are scaled basally and tiny scales extend upon their free portion; caudal covered with minute scales for half or three-fourths of its length. Pectorals moderately pointed or rounded. Ventrals pointed, with a spine and 5 branched rays. Six branchiostegals. Pseudobranchia present (After Herre and Fowler, not seen by us).

Distribution: Indo-australian Archipelago and Philippines. In sea.

Note: Although we follow Herre and Fowler in placing this genus near Caesio, we agree with Fowler that its real place is probably among the Anthiinae, Fam. Serranidae. The two species known, which we have not seen, seem to be very different and perhaps they ought to be separated generically.

Key to the Indo-australian species of Mirolabrichthys

a. Height 2.8—3.2. Premaxillaries with a fleshy conical papilla, only developing with age . . . . 1. *M. tuka* p. 322.
b. Height 3.2—3.5. Premaxillaries without papilla . . . 2. *M. watei* p. 323.

1. **Mirolabrichthys tuka** Herre (Fig. 69)

Mirolabrichthys tuka Herre, Philip. Journ. Sc. XXXII, 1927, p. 413.
Entonanthias pascalus Jordan & Tanaka, Ann. Carnegie Mus. XVII, 1927, p. 385.
Mirolabrichthys tuka Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 226.

D. IX—XI (generally X). 14—16. A. III. 7. P. ?. V. I. 5. Ll. 45—48. Ltr. $\begin{array}{c}5\\ \hline 1\\ \hline 8\end{array}$.

Height 2.8—3.2. Head 3—3.4. Eye 3.5—4.5, 1.4—1.7 in snout and 1.1—1.3 in interorbital space. With age a pointed, flexible, conic papilla, projecting from the premaxillaries. Mouth oblique; the posterior margin of the maxillary extending beyond eye or below hindborder of pupil in young ones, the greatest width of maxillary two-thirds that of eye, the lower jaw included, its tip coming to base of the fleshy snout tip and most of its length concealed by the broad maxillary. Upper jaw with a narrow band of fine teeth in each side posteriorly, becoming a large patch at anterior end of upper jaw and terminating in a stout canine. The lower jaw has very small teeth in narrow bands posteriorly, with a pair of canines at anterior tip and one or two pairs of enlarged teeth a little way behind them. Posterior margin of preopercle finely denticulate. Two flat spines on opercle. First dorsal spine short, the others successively longer to the fourth, the rest subequal, about 4 times in the height; the soft dorsal elevated, much higher than spinous part, the posterior margin sharply angulate, the last four rays successively shortened, the fifth from the last equal or nearly equal to head. Second anal spine the stoutest, the third the longest; the third or fourth anal ray is longest, shorter than the longest dorsal rays. Posterior margin of anal acutely angulate. Pectorals elongate, about 1.3 in head. Ventrals elongate, pointed, shorter than pectorals in young, longer with age, the second and third rays being filamentous. Caudal deeply lobate, the longest ray in both upper and lower lobes more or less filiform. Caudal peduncle almost as deep as long. Colour in alcohol dusky reddish brown above, becoming paler and yellowish with reddish glints below, the fins all pale whitish yellow, without marks; a faint reddish or pinkish band extends from behind eye to base of caudal and another one from beneath pectoral backward along side to lower end of caudal base; a blackish blotch on opercle; a violet brown patch on basal portion of posterior two-thirds of soft dorsal. When fresh the colour was brownish red above, the sides roseate, with two longitudinal golden red bands, the fins golden, the patch in the soft dorsal violet. Length 116 mm (After Herre and Fowler, not seen by us).

Habitat: Danawan and Si Amil Island near Borneo; Dodepo and Pasejogo Islands; Limbe Strait; Celebes (Malibogu Point, Gulf of Tomini); Doworra Island; Togian Island; Kajoa; Makjan. — Philippines.

In sea.

2. **Mirolabrichthys waitei** Fowler (Fig. 70)

Mirolabrichthys waitei Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 228.

D. IX—X. 16. A. III. 7. P. ?. V. I. 5. Ll. 45—49. Ltr. $\begin{array}{c}5\\\hline 1\\\hline 12\end{array}$.

Height 3.2—3.5. Head 3.4—3.6. Eye 3.4—4.1, more than snout, 1—1.1 in interorbital space. Mouth oblique; maxillary reaches three-fourths to four-fifths in eye. Teeth uniserial in jaws, pair of wide set canines above often double and pair of lower front canines recurved outward, also 3 recurved canines medially on each mandibular ramus. Preopercle edge denticulate; one large spine on opercle, other not distinct. Third dorsal spine 1.8—2 in total head length, ninth ray 2 to 2.1. Third anal spine 3.6—3.7, third ray 1.9 to 2. Pectorals somewhat shorter than head, ventrals 1.3—1.4 in head. Caudal deeply forked and slender lobes slightly pointed. In alcohol brown above, pale to whitish below. Each scale on back with obscure darker brown spot. Lower surface with silvery tints. Fins all pale. Length 68 mm (after Fowler, not seen by us).

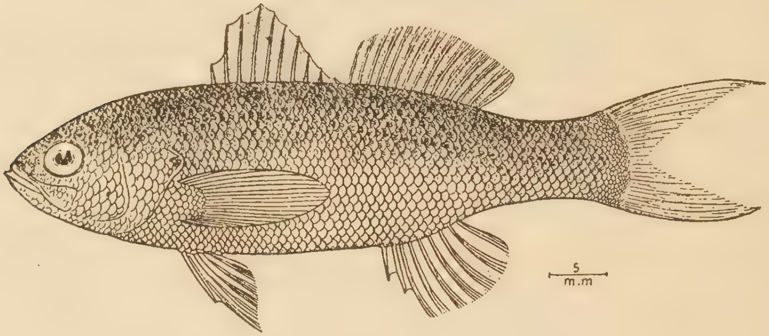

Fig. 70. *Mirolabrichthys waitei* Fowler. After Fowler

Habitat: Sadaa Island, Celebes; Una Una Road, Binang Unang Island, Gulf of Tomini, Celebes. — Philippines.

In sea.

2. Subfam. NEMIPTERINAE.

Body oblong or elongate, more or less compressed, covered with moderate or small ctenoid scales. Snout, jaws, preorbital and suborbital generally naked. Preoperculum, interoperculum, suboperculum, and operculum with rows of scales. Mouth terminal, more or less protractile, moderate or small. Maxillary ramus as broad just below its palatine articulation as it is distally; outer face of palatines with a strong ridge from the base of the maxillary process to the pterygoid. Gillmembranes free from the isthmus. A subocular shelf present, generally strong, sometimes small. Hind-border of preoperculum denticulate or smooth. Teeth in the jaws with or without canines, the posterior ones sometimes molar-like. Palate toothless. A single continuous dorsal, consisting of X spines and 9—10, exceptionally 16 soft rays. Anal with III spines and 7—11 rays. Vertical fins without scales. Caudal emarginate or forked. Pectorals long and pointed. Ventrals with a spine and 5 branched rays.

Distribution: Tropical and subtropical parts of Indic and Pacific.

Key to the Indo-australian genera of Nemipterinae

I. Suborbital with a distinct spine below eye, directed backwards, generally with a few smaller points below it. No canines. . . . . 1. *Scolopsis* p. 325.
II. Suborbital without distinct spine. Canines at least in upper jaw.
  a. Maxillary with a longitudinal, strongly denticulated ridge . . . . 2. *Gnathodentex* p. 347.
  b. Maxillary smooth, without denticulated ridge.
    a'. Sides of jaws with round, flat molar teeth . . . . 3. *Monotaxis* p. 349.
    b'. No molar teeth.
      a^2. Only three transverse rows of scales on preoperculum. D. X. 8—9. A. III. 7 (8). . . . . 4. *Nemipterus* p. 352.
      b^2. Five to seven transverse rows of scales on preoperculum. D. X. 9. A. III. 7. 5. *Pentapus* p. 380.
      c^2. Four to six transverse rows of scales on preoperculum. D. X. 9—11. A. III. 10—11. . . . . 6. *Gymnocranius* p. 390.
      d^2. About ten transverse rows of scales on preoperculum. D. X. 16. A. III. 9. 7. *Symphorus* p. 394.

1. **Scolopsis** Cuvier

(Cuvier, Règne Animal II, 1817, p. 280).

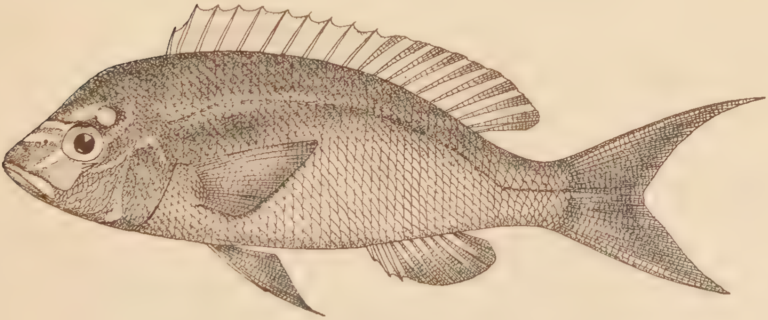

Fig. 71. *Scolopsis temporalis* C.V. × 2/5

Body oblong, somewhat compressed, covered with rather large ctenoid scales. Lateral line continuous, gently curved. Head conical, snout moderate. Eyes rather large. Scales on head extending to between eyes or somewhat further. Preorbital naked. Suborbital with a distinct, larger or smaller pungent spine below eye, directed backwards, generally followed by some shorter spines below. Preoperculum serrated. Operculum with a weak spine. Mouth moderate, protractile. Teeth in the jaws slender and more or less curved, in narrow bands, the outer series enlarged. Palate toothless. Five or six branchiostegals. Gill-rakers few, low tubercles or clavate knobs. Gillmembranes free from isthmus. One continuous dorsal consisting of X spines and 9 branched rays. Anal with III spines and 7—8 rays. Caudal forked. Pectorals pointed. Ventrals with a slender spine and 5 branched rays.

Distribution: Red Sea, tropical and subtropical Indic and Pacific.

Key to the Indo-australian species of Scolopsis

- A. Ll. 36—40.
  - I. Three scales and a half between lateral line and median dorsal spines.
    - *a*. Scales on head beginning somewhat before frontborder of eyes. No bands, scales with silvery spots . . . . 1. *S. margaritifer* p. 328.
    - *b*. Scales on head beginning between eyes. Two dark longitudinal bands on body . 2. *S. leucotaenia* p. 329.
  - II. Two scales and a half between lateral line and median dorsal spines . . . . 3. *S. inermis* p. 330.
- B. Ll. more than 40.
  - I. Two scales and a half between lateral line and median dorsal spines. Ll. 44—45. Longitudinal bands. . . . . 4. *S. trilineatus* p. 331.
  - II. Three scales and a half between lateral line and median dorsal spines
    - *a*. Maxillary with a denticulated ridge. A silvery stripe on back . . . . 5. *S. ciliatus* p. 332.
    - *b*. Maxillary smooth, without denticulated ridge.
      - a^1. Scales on head beginning between anterior part of eyes, at some distance behind nostrils.
        - a^2. Ll. 49—50.
          - a^3. Head pointed. Profile of head straight from nape to snout . 6. *S. personatus* p. 333.
          - b^3. Head blunt. Profile of head convex . . . . 7. *S. taeniopterus* p. 335.
        - b^2. Ll. 44—46.
          - a^3. Maxillary reaching to below frontborder of eye. 4 transverse

rows of scales on preoperculum. Longitudinal margaritaceous bands, more or less connected through margaritaceous patches in older specimens. Height 2.5—3.1 . . . . 8. *S. cancellatus* p. 335.

b^3. Maxillary reaching to below frontborder of eye. Four longitudinal light bands on body. Scales below lateral line each with a black spot at its base. Height 2.7 . . . . 9. *S. ghanam* p. 337.

c^3. Maxillary reaching to below nostrils. A broad silvery band, crossed anteriorly by a pair of short oblique brown streaks, followed by rows of spots. Height 3 . . . . 10. *S. xenochrous* p. 338.

b^1. Scales on head beginning before eyes, reaching on snout to a line connecting anterior nostrils.

a^2. Ll. 44—46. Height 2.6—2.8. Second anal spine not much longer than third. Longitudinal bands in young. In adults an oblique light band, bordered by black above and below, from below eye to base of dorsal 11. *S. bilineatus* p. 339.

b^2. Ll. 42. Height 2.1—2.3. Dorsal spines strong. Second anal spine much stronger and longer than third. A light nuchal band, descending on operculum . . . . . . 12. *S. vosmaeri* p. 341.

III. Four scales and a half or five scales between lateral line and median dorsal spines.

a. Supraocular and temporal region naked. Three light bands on snout. A dark ring on temporal region . . . . 13. *S. temporalis* p. 342.

b. Posterior supraocular region and temporal region scaly. A more or less distinct broad lateral band.

a^1. Height 2.7—3.2. Ll. 47—50 . . . . . . 14. *S. dubiosus* p. 344.

b^1. Height 2.5—2.6. Ll. 43 . . . . 15. *S. monogramma* p. 345.

c. Posterior supraocular region and temporal region scaly. A silvery streak from the muzzle across the preorbital to the eye, continued on preoperculum and generally also on operculum. A light longitudinal band on back, close below dorsal . . . 16. *S. phaeops* p. 346.

1. **Scolopsis margaritifer** C.V.

Scolopsides margaritifer Cuvier & Valenciennes, Hist. Nat. Poissons V, 1830, p. 337.
Scolopsides pectinatus (Kuhl & v. Hasselt) Cuvier & Valenciennes, ibid. p. 346.
Scolopsides margaritifer Bleeker, Verh. Bat. Gen. XXIII (1849) 1850, p. 30.
Scolopsis margaritifer Günther, Cat. Brit. Mus. I, 1859, p. 355.
Scolopsis margaritifer Kner, Novara Exp. Fische I, 1865, p. 58.
Scolopsis margaritifer Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 349. Atl. Ichth. VIII, 1876—1877, p. 3.
Scolopsis margaritifer Macleay, Descr. Cat. Austr. Fish. I, 1881, p. 81.
Scolopsis macrophthalmus Ramsay & Ogilby, Proc. Linn. Soc. New S. Wales VII, 1882, p. 238. Ibid. (2) X, 1886, p. 10.
Scolopsis margaritiferum Evermann & Seale, Bull. Bur. Fish. XXVI (1906), 1907, p. 84.
Scolopsis margaritifer Mc Culloch, Checklist Fish. Austr. Mem. Austr. Mus. V, Prt. II, 1929, p. 207.
Scolopsis margaritifer Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 277.

D. X. 9. A. III. 7. P. 2.14. V. 1.5. Ll. 36—40. Ltr. $\begin{array}{c} 3\frac{1}{2} \\ \hline 1 \\ \hline 13\text{—}14 \end{array}$.

Height 2.6, 3.2 in length with caudal. Head 3—3.2, 4 in length with caudal. Eye 2.6—2.9, scarcely more than snout. Interorbital space somewhat rounded and about seven eighths of eye. Scales beginning on head somewhat before frontborder of eyes. Mouth somewhat oblique. Maxillary smooth, reaching to below frontborder of eye or not so far. Long slender curved teeth in several rows in the jaws, the outer series enlarged. Preoperculum with five transverse rows of scales, the hindborder strongly denticulate, and scalloped above the edge, which is prominent and rounded. Suborbital spine long, reaching to below hindborder of pupil. 3—5 small spines below it. First dorsal spine slightly shorter than second. Second to sixth spines subequal, somewhat more than postorbital part of head. Following spines slightly shorter. Soft dorsal of equal height as spinous part or slightly higher, truncate or slightly rounded. First anal spine short, third longer and more slender than second, as long as longest dorsal spines. Soft anal scarcely deeper than soft dorsal, truncate behind. Pectorals and ventrals subequal, somewhat shorter than head. Caudal forked, the lobes pointed. Colour of preserved specimens light reddish brown or olive above, light below, most scales with a silvery spot. Fins bluish grey or yellowish. Length over 250 mm.

Nomen indig.: Passir-passir (Malay).

Habitat: Singapore; Simalur!; Batu Islands; Sumatra (Telokbetong); Biliton; Java (Batavia!, Bantam); Duizend Islands!; Bumbum Island near Borneo; Celebes (Makassar!, Kema); Limbe Strait; Halmahera; Buru; Ambon; Banda!; Waigeu; New Guinea. — China, Philippines, Solomon Islands, North Australia.

In sea.

2. **Scolopsis leucotaenia** Blkr.

Scolopsides leucotaenia Bleeker, Nat. Tijdsch. Ned. Indië III, 1852, p. 451.
Scolopsides leucotaenioides Bleeker, ibid. VIII, 1855, p. 439.
Scolopsis leucotaenia Day, Fishes of India 1875—1888, p. 88.
Scolopsis leucotaenia Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 351. Atl. Ichth. VIII, 1876—1877, p. 4.
Scolopsis leucotaenia Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 208.
Scolopsis longulus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 288 (nec Rich.).
Scolopsis leucotaenia Herre, Notes Fishes Zool. Mus. Stanf. Univ. 1933, p. 52.

D. X. 9. A. III. 7. P. 2. 14. V. I. 5. Ll. 36—38. Ltr. $\begin{array}{c}3\frac{1}{2}\\\hline 1\\\hline 14\end{array}$.

Height 2.8—3.2, 3.6—4 in length with caudal. Head 3—3.3, 3.8—4.1 in length with caudal. Eye 2.5—2.6, equal to snout, more than snout in small specimens. Interorbital space somewhat convex, 1.4 in eye. Scales on head beginning between eyes, somewhat behind nostrils. Mouth oblique. Maxillary smooth, reaching to below nostrils. Slender curved teeth in bands in jaws, the bands tapering laterally. The outer row of teeth enlarged. Five transverse rows of scales on preoperculum. Preoperculum coarsely serrated behind, its hindborder slightly scalloped. Suborbital spine slender, reaching to below hindborder of pupil. No distinct spines below it. Dorsal spines slender. First spine much more than half length of second, which is shorter than third. Third and fourth spines longest, equal to postorbital part of head and three fourths of eye. Following spines slightly decreasing in length. Tenth spine equal to postorbital part of head and half eye together. Soft dorsal rounded, somewhat higher than spinous part. First anal spine half as long as second, which is stronger but slightly shorter than third. Third spine somewhat more than eye and as long as seventh dorsal spine. Soft anal rounded, deeper than spinous part, but less deep than soft dorsal. Pectorals almost as long as head, ventrals equal to head without snout. Caudal forked. Least height of caudal peduncle 1.5 in its length. Colour of preserved specimens golden. A brown band from eye to middle of base of caudal. A second band above lateral line, from head to end of base of dorsal. A dark blotch between the second to fourth dorsal spines, not always present. Length 111 mm (Typical specimens of Bleeker's collection in the Leiden Museum seen by us).

Habitat: Banka; Biliton; Celebes (Menado); Great Tobea Island; Ceram; Ambon; Nussalaut; New Guinea. — Coast of British India, Philippines, Solomon Islands.

In sea.

Note. Fowler l.c. united this species with *S. longulus* Rich. Last named species has however smaller scales (Ll. 42).

3. **Scolopsis inermis** Schl.

Scolopsides inermis Schlegel, Fauna Japonica, Poissons, 1843, p. 63.
Scolopsides inermis Bleeker, Verh. Bat. Gen. XXVI, 1854—1857. Nieuwe nalez. ichthyol. Japan, p. 83.
Scolopsis inermis Günther, Cat. Brit. Mus. I, 1859, p. 357.
Scolopsis inermis Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 352. Atl. Ichth. VIII, 1876—1877, p. 4.
Scolopsis inermis Steindachner & Döderlein, Denkschr. Akad. Wien XLVIII, 1883, p. 14.
Scolopsis inermis Klunzinger, Fische des rothen Meeres I, 1884, p. 32.
Scolopsis inermis Nyström, Bihang till K. Sv. Vet. Akad. Handl. XIII. Afd. IV. No. 4, 1887, p. 13.
Scolopsides inermis Jordan & Snyder, Proc. U. S. Nat. Mus. XXIII, 1901, p. 751.
Scolopsides inermis Smith & Pope, ibid. XXXI, 1906, p. 477.
Scolopsis inermis Jordan & Thompson, ibid. XLI, 1912, p. 555.
Scolopsis inermis Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 274.

D. X. 10 (11). A. III. 7 (8). P. 2. 14. V. I. 5. Ll. 35—36. Ltr. $\frac{2\frac{1}{2}}{\frac{1}{11\text{—}12}}$.

Height 2.4—2.5, 3—3.3 in length with caudal. Head 2.9—3, 3.5—3.6 in length with caudal. Eye 2.8—3, somewhat more than snout. Interorbital space nearly flat, 1.2—1.4 in eye. Scales beginning between posterior part of eyes, the greater part of the interorbital space naked. Mouth rather oblique. Maxillary smooth, reaching to below frontborder of eye. Slender, somewhat curved teeth in bands in the jaws, the outer row enlarged. Six transverse rows of scales on preoperculum, the hindborder of which is not scalloped and finely denticulate. Suborbital spine very small, but distinct. About six minute spines below it. First dorsal spine much more than half of second. Third and fourth longest, equal to snout and half eye together. Tenth spine equal to distance between point of snout and frontborder of pupil. Soft dorsal rounded, slightly higher than spinous part. First anal spine about half as long as second. Second and third spines subequal, slightly more than eye. Soft anal deeper than spinous part, less high than soft dorsal, rounded below. Pectorals less than half snout shorter than head. Ventrals, with the first ray produced, equal to head without snout. Caudal forked, when expanded only emarginate. Least height of caudal peduncle 1.5 in its length. Colour of preserved specimens brownish, with indications of dark longitudinal bands. Length 230 mm (Typical specimens of Schlegel, as well as specimens from Bleeker's collection in the Leiden Museum seen by us).

Habitat: Java Sea!: Sangir Islands. — Coast of Arabia, Japan.

In sea.

4. **Scolopsis trilineatus** Kner

Scolopsis trilineatus Kner, Sitzber. Akad. Wien LVIII, 1868, p. 27.
Scolopsis trilineatus Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 353.
Scolopsis trilineatus Günther, Fische der Südsee I, 1873—1875, p. 31.
Scolopsis trilineatus Bleeker, Atl. Ichth. VIII, 1876—1877, p. 5.
Scolopsis trilineatus Steindachner, Sitzber. Akad. Wien CXV, 1906, p. 1385.
Scolopsis trilineatus Jordan & Seale, Bull. Bur. Fish. XXV (1905), 1906, p. 268.
Scolopsis trilineatus Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 268. Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 290.

D. X. 9. A. III. 7 (8). P. 2. 14. V. I. 5. Ll. 44—45. Ltr. $\begin{array}{c}2\frac{1}{2}\\1\\\hline 14\end{array}$.

Height 3, 4 in length with caudal. Head 2.9, 3.8 in length with caudal. Eye 2.6, more than snout and than interorbital space. Scales on head beginning slightly behind frontborder of eye. Mouth somewhat oblique. Maxillary smooth, not reaching below frontborder of eye. Narrow bands of slender curved teeth in the jaws, the outer series enlarged. Preoperculum with 5 transverse rows of scales, the inferior limb naked, hindborder scarcely scalloped and strongly denticulate. Suborbital spine long, reaching to below hindmargin of pupil. One or more smaller spines below it. First dorsal spine somewhat shorter than second, which is two thirds of third spine. Third and fourth spines subequal, as long as postorbital part of head. Following spines gently decreasing in length. Soft dorsal not lower than spinous part, rounded behind. First anal spine less than one third of second, which is equal to third and as long as longest dorsal spines. Soft anal about as high as soft dorsal, rounded. Pectorals as long as ventrals, the first ray of which is produced into a filament, and half length of snout shorter than head. Caudal forked. Colour of preserved specimen reddish brown above, silvery on lower part of sides and below. A margaritaceous band from frontborder of eye to snout, where it is connected with that of the other side. A second band behind it, connecting frontborder of eyes and crossing the interorbital space in a straight line. From this band three longitudinal margaritaceous bands arise, a median one to origin of dorsal, the two others running above eye to middle of base of soft dorsal. A broader band, tapering behind, which is a continuation of the first band from eye to snout, runs from hindborder of eye to upper part of base of caudal; below this band a narrow margaritaceous band from below eye to caudal peduncle, fused with the silvery sides and only distinct anteriorly. Fins light yellowish. Length over 200 mm.

Habitat: Java (Batavia); Borneo; Ternate; Ambon; Timor; Kei Islands!; New Guinea. — Philippines, Fiji Islands, Samoa.

In sea.

5. **Scolopsis ciliatus** (Lac.)

Holocentrus ciliatus Lacépède, Hist. Nat. Poissons IV, 1802, p. 333.
Scolopsides lycogenis Cuvier & Valenciennes, Hist. Nat. Poissons V, 1830, p. 346.
Scolopsides lycogenis Bleeker, Verh. Bat. Gen. XXIII (1849) 1850, Sciaen. p. 27.
Scolopsis ciliatus Günther, Cat. Brit. Mus. I, 1859, p. 355.
Scolopsis ciliatus Day, Proc. Zool. Soc. London 1870, p. 683. Fishes of India 1875—1888, p. 89.
Scolopsis ciliatus Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 357. Atl. Ichth. VIII, 1876—1877, p. 6.
Scolopsis ciliata Jordan & Seale, Bull. Bur. Fish. XXVI (1906), 1907, p. 23.
Scolopsis ciliatus M. Weber, Siboga Exp. Fische 1913, p. 280.
Scolopsis ciliatus Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 209. Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 300. Proc. Acad. Nat. Sci. Philadelphia LXXXVI, 1934, p. 75.

D. X. 9. A. III. 7. P. 2. 15. V. I. 5. Ll. 43—45. Ltr. $\begin{array}{c}3\frac{1}{2}\\ \hline 1\\ \hline 12—13\end{array}$.

Height 2.8—3, 3.5—3.9 in length with caudal. Head 3.3—3.4, 4.2—4.3 in length with caudal. Eye 2.5—3, somewhat more than snout and than convex interorbital space. Scales on head beginning before eyes, reaching on snout to a line connecting anterior nostrils. Mouth somewhat oblique. Maxillary with a sharp ridge, which is coarsely denticulated, reaching to below frontborder of eye. Narrow bands of slender curved teeth in the jaws, the outer series enlarged. Preoperculum with 4 transverse rows of scales and two more rows on inferior limb. Posterior border of preoperculum slightly scalloped, strongly denticulate as well as the rounded edge. Preorbital with a short but strong spine, reaching to below hind-border of pupil or not so far. One to three very short spines below it. First dorsal spine two thirds of second, which is somewhat shorter than third. Third to seventh spines subequal, one third of eye longer than postorbital part of head. Following spines gently decreasing in length posteriorly, the last spine longer than the second one. The soft dorsal not lower than the spinous part, slightly rounded. First anal spine more than one third of second. Second and third spines subequal, slightly shorter than longest dorsal spines. Soft anal as high as soft dorsal, rounded. Pectorals and ventrals, the first ray of which is produced into a short filament, subequal and about half length of snout shorter than head. Caudal forked. Colour of preserved specimens reddish brown above, silvery below. A shining silvery longitudinal band, tapering into a stripe posteriorly, on the back: in young ones beginning below lateral line and running to base of dorsal, in older ones totally above lateral line. Fins hyaline or yellowish. Pectoral axil darkish. Length 185 mm.

Nomen indig.: Passir-passir (Malay).

Habitat: Pulu Weh!; Singapore; Simalur!; Batu Islands; Nias; Sumatra (Trussan, Ulakan, Siboga); Java (Batavia!, Japara); Duizend Islands!; Bawean; Bali!; Borneo (Balikpapan); Saleyer!; Celebes (Makassar!, Badjoa, Menado); Sumbawa; Flores!; Rotti!; Ternate!; Halmahera; Batjan; Obi-major; Buru; Ceram!; Ambon; Banda!; Tiur!; Aru Islands!; New Guinea. — Mauritius, Andamans, Philippines, Solomon Islands, Vanicolo.

In sea. Specimens 15—30 mm. long were found by the Siboga Expedition in coastal plankton during the months August—December.

6. **Scolopsis personatus** C.V.

Scolopsides personatus Cuvier & Valenciennes, Hist. Nat. Poissons V, 1830, p. 344.
Scolopsides personatus Bleeker, Nat. Tijdschr. Ned. Indië III, 1852, p. 575.
Scolopsis personatus Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 364. Atl. Ichth. VIII, 1876—1877, p. 9.
Scolopsis personatus Macleay, Descr. Cat. Austr. Fish. I, 1881, p. 82.
Scolopsis personatus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 281.

D. X. 9. A. III. 7. P. 2. 15—16. V. I. 5. Ll. 49—50. Ltr. $\begin{array}{c}3\frac{1}{2}\\ \hline 1\\ \hline 13\end{array}$.

Head pointed, profile of head a straight line from nape to point of snout. Height 2.7—2.8, 3.6 in length with caudal. Head 3—3.1, 3.8—3.9 in length with caudal. Eye 3.1—3.9, 1.4 in snout and less than convex interorbital space. Scales beginning on head above frontborder of eyes, at a distance equal to diameter of pupil behind nostrils. Mouth somewhat oblique. Maxillary smooth, reaching to below frontborder of eye. Narrow bands of slender curved teeth in the jaws. Preoperculum with 5—6 transverse rows of scales and two rows more on inferior limb. Hindborder of preoperculum scalloped, the edge rounded, denticulate behind. Suborbital rather high, its hindborder oblique, with a strong spine and some small spines below it. Dorsal spines rather weak, the first about half as long as second: third and fourth longest, equal to postorbital part of head. Following spines gradually decreasing in length. Soft dorsal about as high as spinous dorsal, rounded. First anal spine less than half length of second, which is somewhat stronger than third, but of the same length and equal to diameter of eye. Soft anal slightly rounded, less high than soft dorsal. Ventrals with the first ray produced, slightly more than head without snout; pectorals somewhat longer. Caudal forked. Colour of preserved specimens light reddish brown above, silvery below, with traces of a dark lateral band. Snout dark. In life a yellowish band from eye to base of caudal and a bluish band between eyes. Length 260 mm. (A specimen of Bleeker's collection in the Amsterdam Museum seen by us).

Nomen indig.: Passir-passir (Malay).

Habitat: Singapore!; Sumatra (Siboga, Padang); Java (Batavia); Celebes (Makassar, Menado); Buton!; Flores! Ternate; Ambon; New Guinea. — Mauritius, Thursday Island!; North Australia (Port Darwin).

In sea.

Note. Klunzinger. (Fische des rothen Meeres I, 1884, p. 33) has united this species with *Scolopsis bimaculatus* Rüpp. We doubt if this is right and provisionally keep these two species apart. *Scolopsis bimaculatus* Blkr. is another species (vide *S. dubiosus*).

7. **Scolopsis taeniopterus** C.V.

Scolopsides taeniopterus Cuvier & Valenciennes, Hist. Nat. Poissons V, 1830, p. 345.
Scolopsides taeniopterus Bleeker, Verh. Bat. Gen. XXIII (1849), 1850, Sciaen. p. 29.
Scolopsis taeniopterus Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 366. Atl. Ichth. VIII, 1876—1877, p. 10.
Scolopsis taeniopterus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 280.

D. X. 9. A. III. 7. P. 2. 15—16. V. I. 5. Ll. 49—51. Ltr. $\begin{array}{c} 3\frac{1}{2} \\ \hline 1 \\ \hline 13-15 \end{array}$.

Head blunt, profile of head slightly rounded. Height 3—3.1, 3.5—3.6 in length with caudal. Head 3.3—3.4, 3.9 in length with caudal. Eye 3.3—3.5, 1.2—1.3 in snout and equal to rather convex interorbital space. Scales beginning on head before eyes, but not reaching on snout as far as nostrils. Mouth somewhat oblique. Maxillary smooth, reaching to below frontborder of eye. Narrow bands of slender curved teeth in the jaws, the outer series enlarged. Preoperculum with 4—5 transverse rows of scales and two rows more on inferior limb. Hindborder of preoperculum scalloped, the edge rounded, denticulate. Suborbital rather high, its hindborder oblique, with a strong but short spine and with or without some minute spines below it. Dorsal spines rather weak. First spine three fourths of second, which is somewhat shorter than third. Third to tenth spines subequal, as long as postorbital part of head. Soft dorsal higher than spinous part, rounded behind. First anal spine half length of second, which is somewhat stronger but not longer than third and as long as diameter of eye. Soft anal somewhat rounded, less high than soft dorsal. Pectorals and ventrals, with the first ray produced, subequal and slightly more than head without snout. Caudal moderately forked. Colour of preserved specimens brownish above, silvery below. A black horizontal narrow band between the eyes, forming the demarcation between the scaly and the scaleless part of the snout. Fins hyaline or light reddish, dorsal with traces of a narrow longitudinal band. Length 230 mm.

Nomen indig.: Passir-passir (Malay).

Habitat: Singapore!; Banka; Java (Batavia). — East coast of Malay Peninsula!.

In sea.

8. **Scolopsis cancellatus** C.V.

? *Scolopsis lineatus* Quoy & Gaimard, Voyage de l'Uranie et de la Physicienne, Zool. 1824, p. 322.

Scolopsides cancellatus Cuvier & Valenciennes, Hist. Nat. Poissons V, 1830, p. 351.
Scolopsides cancellatus Bleeker, Verh. Bat. Gen. XXIII (1849), 1850. Sciaen. p. 28.
Scolopsis cancellatus Günther, Cat. Brit. Mus. I, 1859, p. 361. Fische der Südsee, 1873—1875, p. 31.
Scolopsis cancellatus Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 355.
Scolopsis cancellatus Day, Fishes of India, 1875—1888, p. 86.
Scolopsis cancellatus Bleeker, Atl. Ichth. VIII, 1876—1877, p. 5.
Scolopsis Bleekeri Bleeker, ibid. Pl. 294, Fig. 1 (nec Gthr.).
Scolopsis lineatus Seale, Occ. Papers B. P. Bishop Mus. I, 1901, p. 65.
Scolopsis lineatus Steindachner, Sitzber. Akad. Wien CXV, 1906, p. 1384.
Scolopsis cancellata Jordan & Richardson, Bull. Bur. Fish. XXVII, 1907, p. 259.
Scolopsis cancellatus Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 208 (sine syn.). Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 283.

D. X. 9(10). A. III. 7(8). P. 2. 13—15. V. I. 5. Ll. 43—46. Ltr. $\begin{array}{c}3\frac{1}{2}-4\\ \hline 1\\ \hline 12-13\end{array}$.

Height 2.5—3.1, 3.5—3.8 in length with caudal. Head 3—3.2, 3.8—4 in length with caudal. Eye 2.4—2.8, more than snout and than flat or somewhat concave interorbital space. Scales on head beginning between anterior part of eyes. Mouth slightly oblique. Maxillary smooth, reaching to below frontborder of eye. Bands of slender curved teeth in the jaws, the outer series enlarged. Preoperculum with 4 transverse rows of scales, the inferior limb naked, the posterior border slightly scalloped and denticulate. Suborbital with a long spine, reaching to below hindborder of pupil or somewhat farther. Below it two small spines, which may be wanting. First dorsal spine two thirds of second, which is slightly shorter than third. Fourth to seventh spines subequal, as long as postorbital part of head or somewhat longer. Following spines gently decreasing in length. Soft dorsal not much lower than spinous part, rounded. First anal spine more than one third of second, which is stronger and sometimes also longer than third spine and as long as longest dorsal spines. Soft anal truncate or somewhat rounded, higher than soft dorsal. Pectorals half length of snout shorter than head. Ventrals, with the first ray produced into a filament, as long as pectorals or somewhat shorter. Caudal forked. Colour of preserved specimens reddish brown or olivaceous above, silvery below. In young specimens a median margaritaceous band from between eyes to origin of dorsal. A similar lateral band from above eye to middle of base of dorsal. Another band, broader in front, from hindborder of eye to upper part of caudal peduncle. In older specimens the posterior part of this band disappears, and the band ends below posterior part of spinous dorsal, more or less connected through irregular margaritaceous patches with the band above. The median band on head and nape also gets indistinct in old specimens. Dorsal with a black patch between the first spines, reduced or absent in adults. Axil of pectoral generally blackish. Fins dusky or light yellowish. Length 210 mm.

Nomen indig.: Passir-passir (Malay).

Habitat: Sumatra (Trussan); Biliton; Borneo (Sarawak); Java (Batavia); Bawean; Celebes (Makassar, Badjoa, Menado!); Sangir Islands; Solor; Rotti!; Timor; Ternate; Batjan; Ambon!; Buru!; Ceram; Goram; Gebeh; Rawak; Waigeu; Schouten Islands! — Andamans, Okinawa, Philippines, New Hebrides, widely distributed in Polynesia.

In sea.

9. **Scolopsis ghanam** (Forsk.)

Sciaena ghanam Forskål, Descr. Animalium 1775, p. 50.
Grammistes ghanam Bloch Schneider, Syst. Ichth. 1801, p. 187.
Holocentrus ghanam Lacépède, Hist. Nat. Poissons IV, 1802, p. 328, p. 348.
Scolopsides ghanam Cuvier & Valenciennes, Hist. Nat. Poissons V, 1830, p. 348.
Scolopsis ghanam Günther, Cat. Brit. Mus. I, 1859, p. 362.
Scolopsis ghanam Kner, Novara Exp. Fische I, 1865, p. 268.
Scolopsis ghanam Playfair, Fishes of Zanzibar 1866, p. 30.
Scolopsis ghanam Klunzinger, Verh. zool. bot. Gesellsch. Wien XX, 1870, p. 739.
Scolopsis ghanam Day, Fishes of India 1875—1888, p. 86.
Scolopsis ghanam Kossmann & Räuber, Verh. Naturh. Med. Vereins Heidelberg I, 1876, p. 16.
Scolopsis ghanam Klunzinger, Fische des rothen Meeres I, 1884, p. 34.
Scolopsis ghanam Machan, Ann. naturh. Mus. Wien XLIV, 1930, p. 435.

D. X. 9. A. III. 7. P. 2. 14—15. V. I. 5. Ll. 46. Ltr. $\begin{array}{c}3\frac{1}{2}\\ \hline 1\\ \hline 14\end{array}$.

Height 2.7, 3.3 in length with caudal. Head 3.3, 4 in length with caudal. Eye 3, equal to slightly convex interorbital space and more than snout. Scales on head beginning in posterior part of interorbital space. Mouth somewhat oblique. Maxillary smooth, reaching to below frontborder of eye. Preoperculum evenly denticulate, with a notch above the angle. Suborbital spine strong and curved, followed by a few smaller spines. Dorsal spines rather weak, increasing slightly in length to the fifth, which is equal to postorbital part of head. Soft dorsal slightly higher than spinous part, rounded behind. Second and third anal spines equal or the third spine somewhat longer, shorter than rays. Pectorals somewhat longer than ventrals, more than half length of snout shorter than head. Caudal forked. Colour: back olive; three yellowish white bands, parallel with the lateral line, on the upper part of each side, a fourth shorter band from below the eye to the base of the pectoral, which has a black spot in its axil. Most of the scales below lateral line in the anterior two thirds of the body have each a black spot at its base. A violet mark is present at the base of either lobe of the caudal fin. Length 190 mm.

Habitat: Sumatra (Padang). — Mossambique, Zanzibar, Red Sea!, Arabia, Aden, Persian Gulf, Madras, Andamans, Samoa.

In sea.

Note. This species, which is rather common in the Red Sea, is apparently much rarer in the eastern part of the Indic. It has only recently been recorded for the first time from the Indo-australian Archipelago by Machan l.c. A former record by v. Martens is based on a wrong determination. See *S. xenochrous.*

10. **Scolopsis xenochrous** Gthr.

Scolopsis xenochrous Günther, Ann. Mag. Nat. Hist. (4) V, 1872, p. 423. Brenchley's Cruise of the Curaçoa, 1873, p. 420.
Scolopsis ghanam von Martens, Exp. nach Ostasien, Bd. I, 1876, p. 387 (nec Forsk).
Scolopsis xenochrous Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 276.

D. X. 9. A. III. 7. P. 2. 15. V. I. 5. Ll. 44. Ltr. $\begin{array}{c}3\frac{1}{2}\\ \hline 1\\ \hline 12-13\end{array}$.

Height 3, 3.9 in length with caudal. Head 3.1—3.3, 4.1 in length with caudal. Eye 2.8—3, a little more than snout and equal to or somewhat more than interorbital space. Scales on head beginning between anterior part of eyes, by far not reaching line connecting nostrils. Mouth oblique. Maxillary reaching to below nostrils. Preoperculum with 5 transverse rows of scales, the inferior limb naked, the posterior border conspicuously scalloped and strongly denticulate. Preorbital with a strong spine, two or three small denticulations below it. Dorsal spines moderate, the first more than half length of second. Third to sixth spines longest, equal to snout and half eye together. Seventh and eighth spines subequal, slightly shorter than the preceding ones and slightly longer than the penultimate and last spine. Soft dorsal rounded, as high as spinous part.

First anal spine less than half length of second. Second and third spines subequal, slightly more than diameter of eye. Soft anal slightly rounded, about as deep as soft dorsal. Pectorals half length of snout shorter than head. Ventrals somewhat shorter. Brownish olive; a narrow pearl-coloured band along the uppermost dorsal series of scales; a large blackish-brown spot on the posterior part of the operculum. A broad silvery band, three scales broad, along the trunk below the lateral line; the anterior part of the band is crossed by a pair of short oblique brown streaks, the middle part with a brown spot on the base of each scale, forming oblique rows; the posterior portion uniform pearl-coloured. Preorbital with a narrow silvery band. Fins colourless. Length 175 mm.

Habitat: Misool; Flores! — Philippines.

Note. Günther adds to his diagnosis: "allied to *Scolopsis ghanam*". We have not seen the type-specimen from Misool in the British Museum, but Mr. Norman was so kind to give us informations about it and sent us a drawing of the head, kindly made by Colonel Tenison, which enabled us to describe the scaling of the head and the position of the end of the maxillary. Dr. Pappenheim was so kind to send us the specimen, mentioned by von Martens l.c. as *Scolopsis ghanam* from Larentuka, Flores, and preserved in the Berlin Museum. It does not belong to this species, but agrees in every respect with *S. xenochrous*.

11. **Scolopsis bilineatus** (Bl.)

Anthias bilineatus Bloch, Ausländ. Fische VII, 1793, p. 3.
Lutjanus ellepticus Lacépède, Hist. Nat. Poissons IV, 1802, p. 213.
Scolopsides bilineatus Cuvier & Valenciennes, Hist. Nat. Poissons V, 1830, p. 336.
Scolopsides lineatus Bleeker, Nat. Tijdschr. Ned. Indië V, 1853, p. 73 (nec Q. G.).
Scolopsis bilineatus Günther, Cat. Brit. Mus. I, 1859, p. 357.
Scolopsis bleekeri Günther, ibid. p. 361.
Scolopsis bilineatus Day, Fishes of India 1875—1888, p. 85.
Scolopsis bilineatus Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 359. Atl. Ichth. VIII, 1876—1877, p. 7.
Scolopsis bilineata Snyder, Proc. U. S. Nat. Mus. XLII, 1912, p. 500.
Scolopsis bilineatus Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 209. Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 292.

D. X. 9. A. III. 7. P. 2. 15. V. I. 5. Ll. 44—46. Ltr. $\begin{array}{c} 3\frac{1}{2} \\ \hline 1 \\ \hline 14-15 \end{array}$.

Height 2.6—2.8, 3.2—3.6 in length with caudal. Head 2.9—3.3, 3.7—4.1 in length with caudal. Eye 2.8—3.3, somewhat more than snout and than slightly convex interorbital space. Scales on head beginning before eyes, reaching on snout to a line connecting anterior nostrils. Mouth somewhat oblique; maxillary smooth, reaching slightly beyond vertical through frontborder of eye. Slender curved teeth in narrow bands in the jaws, the outer series enlarged. Preoperculum with 4 transverse rows of scales, and one or two rows more on inferior limb, which is scaly. Posterior border of preoperculum scalloped, the edge rounded, strongly denticulate. Suborbital spine strong, reaching to below hindborder of pupil or somewhat farther. Two to three smaller spines below it. First dorsal spine three fourths of second or somewhat longer. Third slightly longer than second. Fourth to seventh spines subequal, as long as postorbital part of head and half eye together. Soft dorsal higher than spinous part, rounded. First anal spine somewhat less than half length of second, which is somewhat longer than third and as long as longest dorsal spines. Soft anal rounded, as high as or somewhat higher than soft dorsal. Pectorals and ventrals, the first ray of which is produced, subequal, not quite as long as head. Caudal forked. Colour of preserved specimens brownish-olive above, golden or silvery below. In young ones two margaritaceous stripes, running from above eye and from hindborder of eye, parallel to each other, to base of soft dorsal. A third much broader band from snout, below eye to end of dorsal, where it ends in a margaritaceous patch. This band bordered above and below with a narrow black stripe. There is also a median narrow margaritaceous stripe, running from interorbital space to base of dorsal. In older specimens the two superior stripes are relatively much shorter and run upwards in a curved line in the direction of the spinous dorsal, which they do not reach. The light band, still bordered by black lines, also curves upwards and ends below the anterior soft dorsal rays. It does not reach anymore the margaritaceous patch, which is still visible below the end of the soft dorsal. Fins hyaline or yellowish: an elongate black patch, bordered below with white, in upper part of dorsal, between penultimate or last spine and the anterior four or five rays. Membrane between anal spines and first anal ray black, that between first and second ray white. Length 200 mm.

Nomen indig.: Passir-passir (Malay).

Habitat: Pulu Weh!; Singapore; Sumatra (Padang, Trussan); Nias!; Java (Batavia); Bawean; Bali; Celebes (Makassar!, Menado, Badjoa); Limbe Strait; Sangir Islands; Halmahera;

Gomomo Island; Kayoa; Ternate; Batjan; Ceram; Ambon!; Saparua; Banda; Solor; Misool; Waigeu; New Guinea (North and south coast!). — Andamans, Okinawa, Philippines, Solomon Islands, New Hebrides, New Caledonia, eastwards to Fiji Islands. In sea.

12. **Scolopsis vosmaeri** (Bl.)

Anthias vosmeri Bloch, Ausländ. Fische VI, 1792, p. 120.
Perca aurata Mungo Park, Trans. Linn. Soc. III, 1797, p. 35.
Lutjanus Vosmaeri Lacépède, Hist. Nat. Poissons IV, 1802, p. 213.
Lutjanus aureovittatus Lacépède, ibid. p. 216.
Pomacentrus enneodactylus Lacépède, ibid. V, 1802, p. 505, p. 508.
? *Scolopsides kate* Cuvier & Valenciennes, Hist. Nat. Poissons V, 1830, p. 329.
Scolopsides Vosmeri Cuvier & Valenciennes, ibid. p. 333.
Scolopsides torquatus Cuvier & Valenciennes, ibid. p. 335.
Scolopsides Vosmeri Bleeker, Verh. Bat. Gen. XXIII (1849), 1850. Sciaen. p. 27.
Scolopsides torquatus Bleeker, ibid. p. 28.
Scolopsis aurata Cantor, Journ. Asiatic Soc. Bengal XVIII, 1850, p. 1063.
Scolopsis auratus Günther, Cat. Brit. Mus. I, 1859, p. 356.
Scolopsis torquatus Kner, Novara Exp. Fische I, 1865, p. 59.
Scolopsis vosmeri Day, Fishes of India, 1875—1888, p. 87.
Scolopsis Vosmaeri Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 361. Atl. Ichth. VIII, 1876—1877, p. 8.
Scolopsis torquatus Bleeker, ibid. p. 363. Ibid. l.c.
Scolopsis Vosmeri Klunzinger, Fische des rothen Meeres I, 1884, p. 33.
Scolopsis vosmeri Jordan & Evermann, Proc. U. S. Nat. Mus. XXV, 1902, p. 349.
Scolopsis vosmeri Jordan & Starks, Ann. Carnegie Mus. XI, 1917, p. 451.
Scolopsis vosmeri Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 298.

D. X. 9 (10). A. III. 7—8. P. 2. 16—17. V. I. 5. Ll. 42. Ltr. $\frac{3\frac{1}{2}}{\frac{1}{12-14}}$.

Dorsal profile arched. Height 2.1—2.3, 2.6—2.8 in length with caudal. Head 3.1—3.4, 3.8—4.1 in length with caudal. Eye 2.7—3.2, about equal to or longer than snout and equal to or slightly more than convex interorbital space. Scales on head beginning before eyes, reaching on snout before a line connecting anterior nostrils. Mouth somewhat oblique. Maxillary smooth, reaching to below frontborder of eye or slightly farther. Narrow bands of slender curved teeth in the jaws, the teeth of the outer series in the upper jaw enlarged. Preoperculum with 5 or 6 transverse rows of scales and one or two rows of more or less deciduous ones on inferior limb. Hindborder of preoperculum slightly scalloped, rather feebly denticulate. Suborbital high, its hindborder vertical. Suborbital spine short but strong: some small spines below it. Dorsal spines strong. First spine more than half length of second. Third to seventh spines subequal, longest and equal to postorbital part of head and half eye together or somewhat shorter. The other spines only slightly shorter. Soft dorsal as high as or slightly lower than spinous part, rounded. First anal spine not much less than half length of second, which is much longer and stronger than third and as long as longest dorsal spines or somewhat longer. Soft anal rounded, as high as or somewhat lower than soft dorsal. Pectorals and ventrals subequal, lastnamed with the first ray produced, half length of snout shorter than head. Caudal forked. Colour of preserved specimens reddish-brown, breast and belly lighter. A transverse light nuchal band, continued on operculum, where it is generally wider and more silvery. In typical *vosmaeri* a longitudinal silvery band from origin of lateral line, running below it to opposite middle of soft dorsal, where it ends again in the lateral line. Scales of the sides with dark spots, especially the two rows below the longitudinal band. Fins yellowish, soft dorsal and anal sometimes with irregular violet markings. Axil of pectoral with a more or less distinct darkish spot. In the variety *torquatus* the longitudinal band and the spots on the scales are absent. Length 210 mm (Specimens of *S. torquatus* of Bleeker's collection in the Amsterdam Museum seen by us).

Nomen indig.: Passir-passir, Betok lawut (Malay). Kutut (Balikpapan).

Habitat: Singapore; Sumatra (Benkulen, Ulakan); Banka; Duizend Islands!; Java (Batavia, Bantam, Japara); Borneo (Kota Baru!, Balikpapan!, Sandakan); Celebes (Makassar!, Badjoa, Bulukomba); Sumbawa. — Zanzibar, Red Sea, coast of British India, Indochina, Hongkong, Formosa, Philippines.

In sea.

13. **Scolopsis temporalis** C.V. (Fig. 71 p. 325)

Scolopsides temporalis Cuvier & Valenciennes, Hist. Nat. Poissons V, 1830, p. 341.
Scolopsides temporalis Lesson, Voyage de la Coquille, Zool. 1830, p. 197.
Scolopsis temporalis Günther, Cat. Brit. Mus. I, 1859, p. 360.
Scolopsis temporalis Seale, Occas. Papers B. P. Bishop Mus. IV, 1906, p. 45.
Scolopsis temporalis de Beaufort, Bijdr. Dierk. Afl. XIX, 1913, p. 122.
Scolopsis temporalis Mc Culloch, Proc. Linn. Soc. New S. Wales XLVI, 1921, p. 469.
Scolopsis temporalis Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 210. Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 296.

D. X. 9 (10). A. III. 7 (8). P. 2. 16. V. I. 5. Ll. 46—47. Ltr.
$$\begin{array}{c} 4\frac{1}{2}-5 \\ \hline 1 \\ \hline 17 \end{array}.$$

Height 2.6, 3.6 in length with caudal. Head 3.1, 4.2 in length with caudal. Eye 4.1, 1.6 in snout and 1.4 in convex interorbital space. Scales beginning on head between eyes, in the vertical from nostrils, occupying only the median part of the interorbital space and the nape, the supra ocular and temporal region being naked as the snout. Mouth somewhat oblique; maxillary reaching to below frontborder of eye. Narrow bands of slender curved teeth in the jaws, the outer series somewhat enlarged. Six transverse rows of scales on preoperculum and two rows more on inferior limb. Hindborder of preoperculum scalloped, the edge rounded, denticulate. Suborbital rather high, its hindborder oblique, with a moderate spine and some very blunt spines below it. Dorsal spines rather weak. First spine more than half length of second. Third to seventh spines subequal, as long as postorbital part of head. Tenth slightly longer than eighth and ninth. Soft dorsal as high as spinous part, rounded behind. First anal spine half length of second. Third spine somewhat longer than second and slightly more than diameter of eye. Ventrals, with the first ray produced into a filament, one half of snout shorter than head. Pectorals slightly shorter. Caudal deeply forked, the lobes pointed. Colour of preserved specimen dark greenish or bronze above. Lighter and more silvery below. A light narrow band between eyes, at the demarcation between scales and scaleless part of the snout; a second one before it, running through nostrils and a third one, less distinct, from lower border of eye to middle of maxillary. A light bluish narrow band on upper part of preoperculum, running obliquely upwards on operculum, where it bends down, forming a hook. The upper band between eyes is bordered posteriorly by a violet stripe, which bends backwards immediately above eye and ends in a violet ring on temporal region, encircling a yellowish patch. Indication of yellowish band running from head to end of base of dorsal, crossing the lateral line, the scales of which have a dark spot. This light band is bordered below by a darkgreen, somewhat diffuse band. Fins hyaline or light yellowish, the dorsal with traces of a narrow longitudinal submarginal band. Length 437 mm.

Habitat: Danawan and Si Amil Islands near Borneo; North Celebes; Dodepo and Pasejogo Islands in the Gulf of Tomini; Limbe Strait; Great Tobia Island in Buton Strait; Gomomo Island in Pitt Passage; Ambon!; Waigeu; Mysore; New Guinea. — Philippines, Solomon Islands, Louisades, coast of Queensland, Fiji Islands.

In sea.

14. **Scolopsis dubiosus** M. Weber

Scolopsides monogramma Bleeker, Verh. Bat. Gen. XXIII (1849), 1850. Sciaen. p. 29 (ex parte, nec C.V.).
? *Scolopsis bimaculatus* Day, Fishes of India, 1875—1888, p. 85 (nec Rüpp.).
Scolopsis bimaculatus Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 367. Atl. Ichth. VIII, 1876—1877, p. 10 (nec Rüpp.).
Scolopsis monogramma Evermann & Seale. Bull. Bur. Fish. XXVI (1906), 1907, p. 85 (nec C.V.).
Scolopsis dubiosus M. Weber, Siboga Exp. Fische 1913, p. 282.
Scolopsis bimaculatus Jordan & Starks, Ann. Carnegie Mus. XI, 1917, p. 451 (nec Rüpp.).
Scolopsis bimaculatus Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 210. Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 285 (partim).

D. X. 9 (10). A. III. 7. P. 2. 15—16. V. I. 5. Ll. 47—50. Ltr. $\begin{array}{c}4\frac{1}{2}\text{—}5\\\hline 1\\\hline 13\text{—}14\end{array}$.

Height 2.7—3.2, 3.4—4 in length with caudal. Head 2.9—3.3, 3.7—4 in length with caudal. Eye 2.9—3.5, equal to snout in small specimens, 1.1—1.2 in larger ones and equal to or somewhat more or less than slightly convex interorbital space. Scales on head beginning scarcely before vertical through frontborder of eye, far behind nostrils. Mouth somewhat oblique. Maxillary smooth, reaching to below frontborder of eye or nearly so. Narrow bands of slender curved teeth in the jaws, the outer series enlarged. Preoperculum with 5 or 6 transverse rows of scales and 2 rows of deciduous ones on inferior limb. Hindborder of preoperculum scalloped, the edge rounded, denticulate. Suborbital rather high, its hindborder oblique, with a strong spine and with or without some small blunt spines below it. Dorsal spines moderate, the first more than half length of second, which is somewhat shorter than third. Third to fifth spines equal to postorbital part of head or somewhat longer, following spines as long as or only scarcely shorter than the preceding ones. Soft dorsal rounded, somewhat higher than spinous part. First anal spine about half length of second. Second and third spines subequal or the third, which is the weaker, somewhat longer and equal to eye. Soft anal less high than soft dorsal, somewhat rounded. Ventrals, with the first ray produced, equal in length to the pectorals and half length of snout shorter than head. Caudal moderately forked. Colour of preserved specimens reddish-brown, more or less silvery below. A bluish band between eyes, forming the demarcation between scaly and scaleless part of snout. A black band, broadest in the middle, from hindborder of eye to upperpart of caudal peduncle, better developed in young than in old specimens. Fins hyaline. Length over 300 mm. (Specimens of *S. bimaculatus* of Bleeker's collection in the Amsterdam Museum seen by us).

Nomen indig.: Passir-passir (Malay); Tontong (Batavia), Sidemo (Ambon).

Habitat. Pulu Weh!; Singapore!; Bintang; Banka; Java (Batavia!); Duizend Islands!; Bali; Borneo (Balikpapan!); Celebes (Makassar!, Bonthain, Bulukomba, Tanawanko); Ternate; Batjan; Ambon. — Coast of British India, Indochina, Philippines and West Australia.

In sea.

Note. Klunzinger (Fische des rothen Meeres I, 1884, p. 33) has shown, that *S. bimaculatus* Rüpp. is different from the species described under that name by Bleeker. *S. taeniatus* C.V., which species Bleeker and others have placed amongst the synonymy of this species, as well is different, as has also been explained by Klunzinger. One of us proposed therefore the name *dubiosus* for the species of Bleeker. Fowler (l.c.) places *Scolopsis affinis* Peters (Monatsber. Akad. Berlin (1876), 1877, p. 832) amongst the synonymy of this species. If this were true, the species now under consideration ought to be called *affinis*. According to the description given by Peters *S. affinis* is not this species, but probably *S. phaeops*.

15. **Scolopsis monogramma** C.V.

Scolopsides monogramma Cuvier & Valenciennes, Hist. Nat. Poissons V, 1830, p. 338.
Scolopsis monogramma Günther, Cat. Brit. Mus. I, 1859, p. 358.
Scolopsis monogramma Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 369. Atl. Ichth. VIII, 1876—1877, p. 11.
Scolopsis monogramma Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 209. Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 286.

D. X. 9. A. III. 7. P. 2. 16. V. I. 5. Ll. 43. Ltr. $\frac{4\frac{1}{2}}{\frac{1}{14}}$.

Height 2.5—2.6, 3.2—3.3 in length with caudal. Head 3.2—3.3, 4—4.2 in length with caudal. Eye 3.2—3.4, somewhat less than snout and than slightly convex interorbital space. Scales beginning on head between eyes, at a distance behind nostrils less than diameter of pupil. Temporal region scaly. Mouth somewhat oblique. Maxillary smooth, reaching beyond vertical through posterior nostril but before vertical through frontborder of eye. Small pointed straight teeth in bands in jaws. Five to six transverse rows of scales on preoperculum. Hindborder of preoperculum strongly scalloped, the angle prominent, coarsely denticulated. Suborbital rather high, its hindborder oblique. Suborbital spine strong but short, about as long as pupil. A few spines, not very distinct and more like crenulations of the hindborder of the suborbital, below it. Third to fifth dorsal spines subequal, equal to snout. Following spines slightly shorter, but the last somewhat longer than ninth. Soft dorsal rounded, somewhat higher than spinous part. First anal spine half as long as second, third spine longest, equal to diameter of eye. Soft anal less deep than soft dorsal, rounded. Pectorals half length of snout shorter than head; ventrals, with the first ray produced, slightly shorter. Caudal forked. Colour of preserved specimens uniform. A broad horizontal light band connecting anterior border of eyes. Length 320 mm. (Specimens of Bleeker's collection in the Leiden Museum seen by us).

Nomen indig.: Passir-passir (Malay), Sidemo (Ambon).

Habitat: Singapore; Bintang; Banka; Java (Batavia, Bantam, Anjer); Bali; Timor; Celebes (Makassar, North Celebes); Batjan; Ternate; Makjan; Ambon; New Guinea. — Formosa, Philippines, New Hebrides, Fiji.

In sea.

16. **Scolopsis phaeops** Benn.

Scolopsides phaeops Bennett, Proc. Zool. Soc. London 1831, p. 165.
Scolopsis phaeops Günther, Cat. Brit. Mus. I, 1859, p. 358.
Scolopsis nototaenia Playfair, Fishes of Zanzibar 1866, p. 29.
Scolopsis phaeops Playfair, Proc. Zool. Soc. London 1867, p. 851.
Scolopsis phaeops Day, Fishes of India 1875—1888, p. 85.
Scolopsides phoeops Sauvage, Poissons de Madagascar 1891, p. 176.
Scolopsis phaeops Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 282.
Scolopsis phaeops Borodin, Bull. Vanderbilt Marine Mus. I, Art. 3, 1932, p. 82.

D. X. 9. A. III. 7. P. 2. 14. V. I. 5. Ll. 46—48. Ltr. $\frac{5}{\frac{1}{16-17}}$.

Height 2.5—3, 3—3.7 in length with caudal. Head 2.9—3.3, 4—4.3 in length with caudal. Eye 3.2—3.6, 1.2—1.6 in snout and 1—1.3 in very slightly convex interorbital space. Scales on head beginning slightly behind nostrils. Mouth moderate, slightly oblique. Maxillary not reaching to the vertical from the anterior margin of the orbit. Teeth in broad villiform bands in the jaws, about 7 irregular rows anteriorly. Preoperculum with 6 transverse series of scales, the inferior limb naked. Hindborder of preoperculum armed with about twelve rather distant spinous teeth, the middle of which are longest; the angle is rounded and projecting, and armed with about 8 spinous teeth. Lower border of preoperculum smooth. Suborbital spine strong, flat and pointed, and there are 5 spinous teeth besides, much smaller than the spines, but similar in shape. Dorsal spines moderate, not flexible. The first is two thirds of the second; the second is rather shorter than the following four, which are longest, and one-third of the height of the body. The soft dorsal is rather higher, the sixth and seventh ray being the longest. Origin of anal beneath the second dorsal ray. Anal spines rather stronger than those of dorsal. First spine nearly one half of the second; second three-quarters of the third, which is one third of the length of the head. The margin of the soft portion of the anal is slightly rounded, the posterior rays gradually becoming shorter. Pectorals about half length of snout shorter than head. Ventrals shorter, their spine two-thirds of the first ray. Caudal deeply forked, the upper lobe the longer. Colour of preserved specimens greenish above, sides and below lighter. A narrow light band along the back close to the base of the dorsal. A silvery streak from the muzzle across the preorbital to the eye; another from the suborbital spine to the angle of the preoperculum, generally continued on operculum and from there to axil of pectoral. Fins dull brown. Length 265 mm. (Compiled, not seen by us).

Habitat: Singapore; Great Tobea Island in Buton Strait. — Madagascar, Mauritius, Réunion, Seychelles, coast of Arabia, Ceylon, coast of British India, Philippines.

In sea.

2. **Gnathodentex** Bleeker [1]

(Bleeker, Versl. Akad. Amsterdam (2) VII, 1873, p. 41. — Verh. Akad. Amsterdam. XIII, 1873, Révision Dentex etc., p. 49).

Pentapus Günther, Fische der Südsee. I. 1873—1875, p. 32(nec C.V.).

Body oblong, somewhat compressed, covered with small ctenoid scales. Lateral line continuous, in the upper part of the body, but

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1) See note under Pentapus.

nearer to middle of side than to dorsal profile, running on caudal peduncle somewhat above the middle. Head conical. Interorbital space, snout and preorbital naked, lastnamed not ending in a point, covered by skin. Regular rows of scales on opercular bones, hind- and lower margin of preoperculum naked. Hindborder of preoperculum rough, but without distinct serrations, slightly festooned at preopercular edge. Operculum with a single stiff spine. Mouth rather small, somewhat oblique. Upper jaw slightly protractile. Maxillary naked, provided with a longitudinal, strongly and coarsely serrated ridge. Teeth in the jaws in a narrow villiform band and with an outer series of caninoid ones. Four moderate canines in front of upper jaw, six in lower jaw, the outmost larger than the others and somewhat curved outwards and backwards. Palate toothless. Six branchiostegals. Gillrakers few and knoblike. Gillmembranes free from isthmus, united to each other in their anterior part. One dorsal fin consisting of X rather slender spines and 10 branched rays. Anal with III spines and 7 soft rays. Caudal forked. Pectorals moderately pointed. Ventrals with a slender spine and five soft rays, the first of which is the longest.

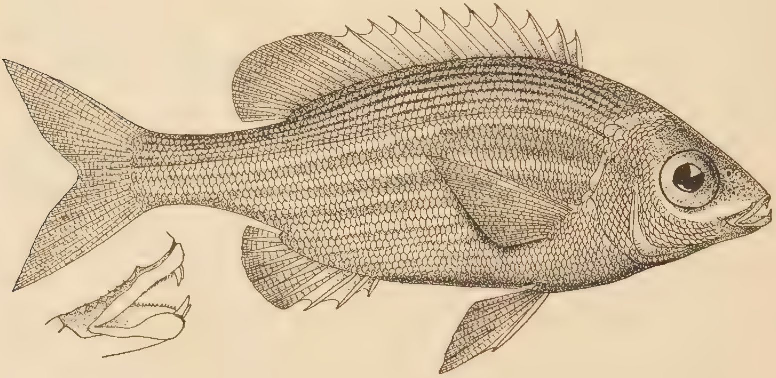

Fig. 72. *Gnathodentex aurolineatus* (Lac.) × 2/3

Distribution: Indopacific.

1. **Gnathodentex aurolineatus** (Lac.). (Fig. 72 p. 348)

Sparus aurolineatus Lacépède, Hist. Nat. Poissons IV, 1803, p. 132.
Pentapus aurolineatus Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1930, p. 269 et p. 559.
Dentex lycogenis Bennett, Proc. Zool. Soc. London. I, 1830—1831, p. 127.
Pentapus aurolineatus Bleeker, Nat. Tijdschr. Ned. Indië. VI, 1854, p. 55.
Pentapus aurolineatus Günther, Cat. Brit. Mus. I, 1859, p. 381.
Pentapus aurolineatus Day, Fishes of India 1875—1888, p. 93.

Pentapus aurolineatus Günther, Fische der Südsee I, 1873—1875, p. 33.
Gnathodentex aurolineatus Bleeker, Verh. Akad. Amsterdam. XIII (1872), 1873, Révision Dentex, p. 49. — Atl. Ichth. VIII, 1876—1877, p. 99.
Pentapus aurolineatus Macleay, Proc. Lin. Soc. N. S. Wales VII, 1882, p. 240.
Pentapus aurolineatus Bryan & Herre, Occas. Papers Bishop Mus. II, 1930, p. 130.
Pentapus aurolineatus Pellegrin, Bull. Mus. Hist. Nat. Paris. No. 4, 1912 p. 1.,
Pentapus aurolineatus Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 217.
Pentapus aurolineatus Borodin, Bull. Vanderbilt marine Mus. I, art. 3, 1932, p. 83.
Pentapodus aurolineatus Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 76.

D. X. 10. A. III 9. P. 2. 13. V. I. 5. Ll. 70--78. Ltr. $\begin{array}{c} 5\frac{1}{2} \\ \hline 1 \\ \hline 19 \end{array}$.

Height 2.7, 3.4 in length with caudal. Head 3.4, 4.2 in length with caudal. Eye 2.8, equal to snout and to interorbital space. Maxillary not reaching below frontborder of eye. About five curved rows of scales on preoperculum. Third and fourth dorsal spines longest, somewhat more than eye, and only slightly shorter than third anal spine. First anal spine less than half of second, which is about four fifths of third. Pectorals nearly as long as head, ventrals somewhat shorter. Colour of preserved specimens reddish brown, lighter below, with about 8 longitudinal pearly white stripes, the upper one narrower than the lower ones. A broad silvery stripe on preorbital, continued below eye and following orbital margin. Spinous dorsal, anal and caudal light reddish brown, soft dorsal and anal, pectorals and ventrals lighter. Length 265 mm.

Habitat: Pulu Weh!; Halmahera; Buru; Gomomo Island; Ambon; Banda!; New Guinea. — Seychelles, Mauritius, Ceylon, Cocos Islands, Philippines, Pacific Islands eastwards to the Paumotu Islands.

In sea.

3. **Monotaxis** Bennett

(Bennett, In Life of Raffles, 1830, p. 688).

Sphaerodon Rüppell, Neue Wirbelthiere, Fische, 1835, p. 112.

Oblong, compressed. Upper front profile steep, strongly convex. Scales feebly ctenoid, almost smooth in large specimens. Upper part of head, preorbital, suborbital and jaws naked. Scales beginning on occiput with an elongate supra-temporal patch of scales, widely separated from that of the other side and, by a narrow scaleless interspace, from the scales behind. Opercular region scaly. Preopercular limb naked inferiorly and in its lower part posteriorly. Hind-border of preoperculum finely denticulate, in old specimens only rough. Operculum with a flat spine. Lips thick. An oval patch of small teeth in each ramus of upper and lower jaw, with an outer row of strong, distant canines, continued on sides of jaws in a single series of large, oval, flat molars, increasing in size posteriorly. Palate edentulous. One single dorsal, consisting of X slender, but not flexible, pungent, heteracanth spines and 10 (11) soft rays. Anal with III spines, similar to those of the dorsal and 9 (10) soft rays. Pectorals long, pointed. Ventrals with a spine and 5 branched rays, the first of which is filamentous. Caudal forked. Branchiostegals 6. Gillrakers few, knob-like. Pseudobranchiae present.

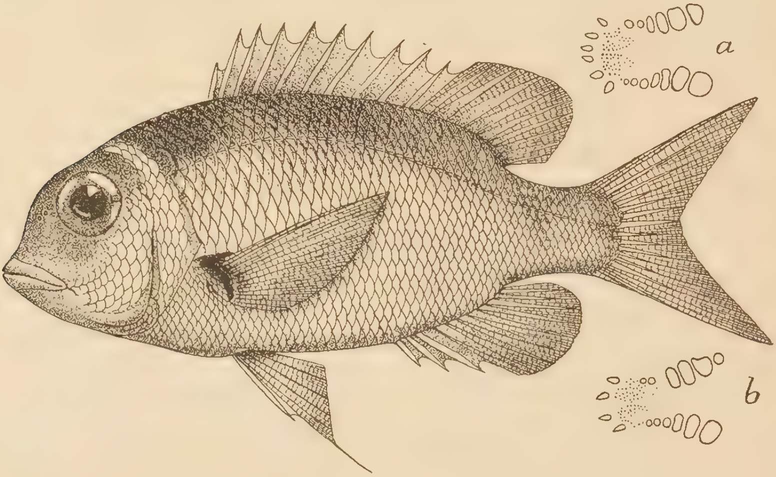

Fig. 73. *Monotaxis grandoculis* (Forsk.) × 1/2. a. Teeth of upper jaw. b. Teeth of lower jaw.

Distribution that of the single species known.

1. **Monotaxis grandoculis** (Forsk.) (Fig. 73)

Sciaena grandoculis Forskål, Descr. Animalium 1775, p. 53.
Sparus grandoculis Bloch Schneider, Syst. Icht. 1801, p. 276.
Sparus grandoculis Lacépède, Hist. Nat. Poissons IV, 1802, p. 35, p. 112.
Chrysophrys grandoculis Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 134.
Lethrinus latidens Cuvier & Valenciennes, ibid. p. 316.
Monotaxis indica Bennett, In Life of Raffles, 1830, p. 688.
Sphaerodon grandoculis Rüppell, Neue Wirbelthiere, Fische 1835, p. 113.
Pagrus heterodon Bleeker, Nat. Tijdschr. Ned. Indië VI, 1854, p. 54.
Sphaerodon grandoculis Günther, Cat. Brit. Mus. I, 1859, p. 465.
Sphaerodon heterodon Günther, l.c.
Sphaerodon latidens Kner, Novara Exp. Fische I, 1865, p. 83.
Sphaerodon grandoculis Klunzinger, Verh. zool. bot. Gesellsch. Wien XX, 1870. p. 756.

Sphaerodon heterodon Day, Fishes of India 1875—1888, p. 138.
Sphaerodon grandoculis Günther, Fische der Südsee I, 1873—1875, p. 67.
Monotaxis grandoculis Bleeker, Atl. Icht. VIII, 1876—1877, p. 105.
Monotaxis (Sphaerodon) grandoculis Peters, Monatsber. Akad. Berlin (1876), 1877, p. 834.
Sphaerodon euanus Günther, Ann. Mag. Nat. Hist. (5) IV, 1879, p. 136.
Sphaerodon grandoculis Macleay, Descr. Cat. Austr. Fish I, 1881, p. 116.
Sphaerodon grandoculis Klunzinger, Fische des rothen Meeres I, 1884, p. 41.
Sphaerodon grandoculis Day, Fishes of India, Suppl. 1888, p. 787, Fauna of British India, Fishes II, 1889, p. 41.
Sphaerodon grandoculis Steindachner, Denkschr. Akad. Wien LXX, 1900, p. 487.
Monotaxis grandoculis Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII (1903), 1905, p. 243.
Monotaxis grandoculis Seale, Occas. Papers B. P. Bishop Mus. IV, 1906, p. 46.
Monotaxis grandoculis Jordan & Seale, Bull. Bur. Fish. XXV (1905), 1906, p. 271.
Monotaxis grandoculis Herre & Montalban, Philipp. Journ. Sci. XXXIII, 1927, p. 425.
Monotaxis grandoculis Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 219. Bull. U. S. Nat. Mus. XII, 1933, p. 134.

D. X. 10 (11). A. III. 9 (10). P. 2. 12. V. I. 5. Ll. 47. Ltr. $\begin{array}{c}4\frac{1}{2}—5\\ \hline 1\\ \hline 14—15\end{array}$.

Height 2.3—2.4, 2.8—3.2 in length with caudal. Head 3—3.1, 3.7—4 in length with caudal. Eye 2.4—3.3, equal to snout in young specimens, 1.2—1.5 in large ones, about equal to or 1.4 (in large specimens) in flat or somewhat convex interorbital space. Mouth somewhat oblique; maxillary reaching to below frontborder of eye in young, nearly to below middle of eye in large specimens. A broad patch of small teeth in the jaws anteriorly, with a series of about 4 canines on each side, followed by a single row of large, laterally elongate flat molars. Palate edentulous. Four to five transverse rows of scales on preoperculum. Lower preopercular limb naked. Hindborder of preoperculum minutely denticulate in young, rough to almost smooth in older specimens. Nine or ten rows of scales between occiput and dorsal. Dorsal spines slender. First spine more than half length of second. Fifth spine longest, equal to postorbital part of head or somewhat longer. Soft dorsal rounded, the median rays the longest, much longer than spines, and equal to head without snout. Anal spines rather stout. First spine less than second; third spine longest, about equal to postorbital part of head. Soft anal rounded, equal in height to soft dorsal. Pectorals pointed, as long as head. Ventrals, with the first ray produced, slightly shorter. Caudal forked. Least height of caudal peduncle 1.3—1.5 in its length. Colour of preserved specimens reddish-brown above, silvery below. Scales of back and upper part of sides each with two more or less conspicuous margaritaceous spots. Two narrow transverse margaritaceous bands from back to middle of sides, broader in young and disappearing with age; one below origin of dorsal and the other below last spines and first ray. A third, less distinct one, below end of dorsal. In young ones the dorsal is black with three transverse white bands, being the continuation of the bands on the body. In older specimens the dorsal is only blackish at base or more or less dusky. Anal with a black blotch anteriorly in young, dusky or yellowish in older specimens. Pectorals yellowish. Pectoral axil black, as well as a narrow elongate patch above it, confluent with the black of the axil. Ventrals yellowish, more or less leaden-coloured in young. Caudal with a submarginal dark reddish band on each lobe, in older specimens dark reddish all over, fainting into almost white at the hindmargin, or almost evenly yellowish. Length over 600 m.

Nomen indig.: Lĕvovangan (Tapah, Simalur).

Habitat: Pulu Weh!; Sumatra (Benkulen): Simalur!; Batu Islands; Celebes (Menado, Kait Point); Limbe Strait; Gomomo Island; Halmahera; Ternate; Obi-major; Ambon; Banda!; Mysore; New Guinea. — Red Sea, Seychelles, Ceylon, Christmas Island, Philippines, North Australia, Pacific Islands eastwards to Hawaiian Islands and Society Islands.

In sea.

4. **Nemipterus** Swainson

(Swainson, The Natural History of Fishes II, 1839, p. 223)

Synagris Günther, Cat. Brit. Mus. I, 1859, p. 373.
Dentex Bleeker, Versl. Akad. Amsterdam (2) VII, 1873, p. 40 (nec Cuvier).
Anemura, Odontoglyphis, Euthyopteroma, Fowler, Journ. Acad. Nat. Sci. Philadelphia (2) XII, 1904, p. 527.

Body elongate, compressed, covered by moderate ctenoid scales. About fifty scales in the lateral line, which is continuous, straight. Profile of head more or less convex. Head naked, with exception of the posterior part, where the scales begin above middle of eye or somewhat posteriorly in the median line, leaving a supra-orbital narrow space on each side naked and forming posteriorly a more or less distinct supra-temporal band. Operculum and preoperculum with large cycloid scales, those on preoperculum in three oblique rows, leaving a broad or narrow limb naked. Lips rather thick.

Mouth small, moderately protractile, almost horizontal or oblique. Conical pointed teeth in several rows in the anterior part of the jaws, tapering posteriorly and generally forming but a single row laterally, which consists of larger, often caninoid teeth and is a continuation of the outer row anteriorly, where the teeth are also larger than those of the inner rows. Anteriorly to these on each side of the upper jaw 3—4 curved canines. In the lower jaw these canines are present or absent. Palate edentuluous. Six branchiostegals. Hindborder of preoperculum straight, finely denticulate, crenulated or smooth. Operculum with an indistinct spine. One single dorsal, consisting of X spines, which may be rigid and pungent or flexible, in the last case sometimes filamentous. Soft dorsal with 8—9 rays, forming with the spinous part one continuous fin, without notch between them. Anal with III weak spines, the first much smaller than the others, the third generally somewhat longer than the second. Soft anal consisting of 7 rays, deeper than the spinous part. Vertical fins without scaly sheath. Pectorals in most species long and pointed. Ventrals with the first ray produced into a filament. Caudal forked, generally much so and in a few species with the upper lobe produced into a filament. Pseudobranchiae present.

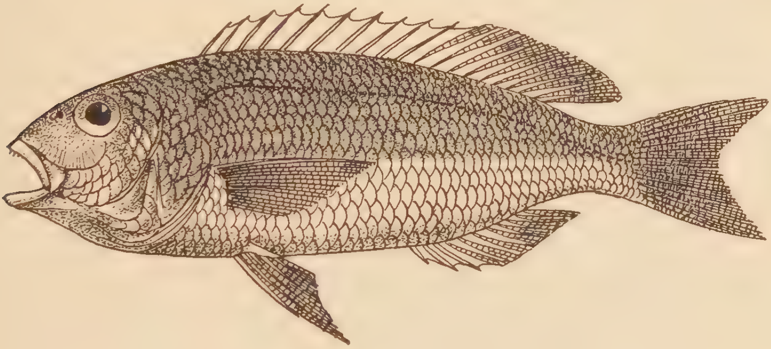

Fig. 74. *Nemipterus hexodon* (Q. G.)

Distribution: Coastal waters of Indic, Red Sea, and West Pacific. The type species said to be from Surinam, but this is probably a mistake.

Note. Some species, collected by the Elbert-Expedition in the Indo-australian Archipelago and described by Miss Popta, are recorded from fresh water. We can hardly believe this and think it more probable, that they have been caught near the river-mouth in brackish water.

Swainson founded his genus *Nemipterus* on *Dentex filamentosus* C.V. It has been accepted by several authors, but others reject it, f.i. Fowler (Bull. U. S. Nat. Mus. Vol. XII, 1933, p. 128), because the figure, published by Cuvier & Valenciennes shows more than three rows of scales on the preoperculum, which is one of the chief differences between the genus, now under consideration, and *Dentex*. Dr. Koumans kindly examined the type of *Dentex filamentosus* in the Leiden Museum. It has 3 transverse rows of scales on the preoperculum and fits entirely in the genus *Synagris,* as defined by Günther (l.c.). There is therefore no reason to reject *Nemipterus.*

Key to the Indo-australian species of Nemipterus

I. Canines in lower jaw as well as in upper jaw.	
A. Posterior angle of suborbital very oblique, its hindborder forming a more or less straight line, which, when produced, reaches the dorsal profile in the anterior part of the dorsal.	
a. Body uniform.	
a^1. Height 3.2—3.5	1. *N. peronii* p. 357.
b^1. Height 3.7—3.8	2. *N. sundanensis* p. 358.
b. Body with transverse bands, not always distinct in preserved specimens. Height 3.7—3.8.	3. *N. ovenii* p. 359.
B. Posterior angle of suborbital not very obtuse, its hindborder forming a more or less straight line, which, when produced, reaches the dorsal profile far before dorsal.	
a. Depth of suborbital equals vertical diameter of eye.	
1. Height 2.9—3.1	4. *N. hexodon* p 360.
2. Height 3.9	5. *N. celebicus* p. 362.
b. Depth of suborbital about twice in vertical diameter of eye.	
1. Height 3.8. Upper caudal lobe produced into a filament . . .	6. *N. nemurus* p. 364.
2. Height 4.1—4.4	7. *N. metopias* p. 365.
II. Canines in upper jaw only.	
A. First and second dorsal spines much produced, exceeding base of dorsal in length	8. *N. nematophorus* p. 366.

- B. First and second dorsal spines shorter than the following.
  - *a*. Membrane between dorsal spines deeply emarginate. . . . . 9. *N. tolu* p. 367.
  - *b*. Membrane between dorsal spines not or only slightly emarginate.
    - a^1. Height of head more than its length without operculum.
      - a^2. Height 2.6—2.7 . . . . 10. *N. japonicus* p. 369.
      - b^2. Height 3.2 to nearly 4.
        - a^3. Pectorals as long as head without snout. Back with 8-9 dark vertical blotches. 11. *N. oveniides* p. 371.
        - b^3. Pectorals slightly shorter than head. No vertical dark blotches.
          - a^4. First ray of ventrals with a long filament, which reaches to anal. 12. *N. marginatus* p. 372.
          - b^4. First ray of ventrals, if filamentous, never reaching as far as anal. Dorsal spines rigid, pungent.
            - a^5. Height of suborbital equal to vertical diameter of eye. Naked limb of preopercle much less than the scaly part. . . . . . . 13. *N. mesoprion* p. 373.
            - b^5. Height of suborbital somewhat less than vertical diameter of eye. Naked limb of preopercle slightly less than scaly part. . 14. *N. tambuloides* p. 374.
    - b^1. Height of head equal to length without operculum.
      - a^2. Suborbital emarginate, its depth 2—3 in vertical diameter of eye. Naked limb of preoperculum 2—2.5 in scaly part.
        - a^3. Eye 2.3, longer than snout. Depth of suborbital thrice in vertical diameter of eye, its hindborder, when produced, reaches dorsal profile about 8 scales before dorsal. Preoperculum

distinctly denticulate. Pectorals almost as long as head. . . . . 15. *N. balinensis* p. 375.

b^3. Eye 2.9, longer than snout. Depth of suborbital four times in vertical diameter of eye, its hindborder, when produced, reaches third dorsal spine. Preoperculum distinctly denticulate. Pectorals slightly more than snout and eye together . . . 16. *N. balinensoides* p. 376.

c^3. Eye 3.1, equal to snout. Depth of suborbital twice or somewhat more than twice in vertical diameter of eye.

a^4. Hindborder of suborbital, when produced, reaches dorsal profile 6 scales before origin of dorsal. Hindborder of preoperculum rugose. Pectorals half length of snout shorter than head . . . 17. *N. sumbawensis* p. 377.

b^4. Hindborder of suborbital, when produced, reaches dorsal profile one scale before origin of dorsal. Hindborder of preoperculum distinctly denticulate. Pectorals almost as long as head. 18. *N. zysron* p. 378.

b^2. Suborbital not emarginate. Hindborder of preoperculum smooth.

a^3. Naked limb of preoperculum nearly as deep as scaly part. Depth of suborbital somewhat less than vertical diameter of eye. Height 3.3 . . . . 19. *N. upeneoides* p. 379.

b^3. Naked limb of preoperculum more than half as deep as scaly part. Depth of suborbital more than half vertical diameter of eye. Height 3.8—3.9. . . 20. *N. gracilis* p. 379.

1. **Nemipterus peronii** (C.V.)

Dentex Peronii Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 245.
Synagris furcosus Günther, Cat .Brit. Mus. I, 1859, p. 373 (nec C.V.).
Dentex hypselognathus Bleeker, Versl. Akad. Amsterdam XIII (1872), 1873, Révision Dentex, p. 9. Atl. Ichth. VIII, 1876—1877, p. 84.
Synagris furcosus Macleay, Descr. Cat. Austr. Fish. I, 1881, p. 83 (nec C.V.).
Nemipterus robustus Ogilby, Proc. Roy. Soc. Queensland XXVIII, 1916, p. 114.
Synagris hypselognathus M. Weber, Siboga Exp. Fische 1913, p. 282.
Nemipterus hypselognathus Herre, Notes Fish. Zool. Mus. Stanf. Univ. 1931, p. 55.

D. X. 9—10. A. III. 7. P. 2. 14. V. I. 5. Ll. 48—50. Ltr. $\begin{array}{c} 3\frac{1}{2} \\ \hline 1 \\ \hline 12-13 \end{array}$.

Profile of head convex. The height of the head, measured in vertical through hindborder of preoperculum, equal to length of head without operculum, or slightly less in small and slightly more in large specimens Height 3.2—3.5, 4—4.5 in length with caudal. Head 3.2—3.3, 4—4.2 in length with caudal. Eye 3.1—3.7, 1.2—1.7 in snout, and equal to or slightly more than convex interorbital space. Mouth somewhat oblique; maxillary reaching to a vertical between nostrils and eye or to below frontborder of eye. Jaws equal. Narrow bands of small pointed teeth in the jaws, with an outer series of about 14 crowded caninoid teeth on both sides and 6 canines in each jaw in front. Posterior angle of suborbital very obtuse, the hindborder very oblique, forming a more or less straight line, which, when produced, reaches the anterior part of the dorsal fin. Greatest depth of suborbital more or less than horizontal diameter of eye, almost half of the vertical diameter of eye. Naked limb of preoperculum as deep as or slightly narrower than the scaly part. Hindborder of preoperculum smooth or very slightly crenulate. Scales beginning on head before hindborder of eye with an ill-defined temporal band of 4 rows of scales. Dorsal spines slender, flexible but pungent. The first spine about three fourths of second. Second to fourth of equal length, slightly shorter than fifth to eighth, which are equal to postorbital part of head: ninth and tenth slightly shorter. Dorsal membrane between the spines slightly emarginate. Soft dorsal slightly lower than spinous part, somewhat pointed posteriorly. Anal spines slender. The first about half as long as the second; third longest, equal to diameter of eye or somewhat shorter. Soft anal rays somewhat longer than third spine. Inferior border of anal somewhat rounded, pointed posteriorly. Pectorals half length of snout shorter than head or somewhat longer. Ventrals slightly shorter. Caudal deeply forked.

Least height of caudal peduncle 1.7 to almost twice in its length. Colour of preserved specimens reddish above, silvery below, with indications of rather broad yellow longitudinal bands on the sides. Fins hyaline. Length 270 mm.

Habitat: Simalur!; Java (Batavia); Celebes (Makassar!, Badjoa, Menado); Karakalong Islands!; Obi major!; Nussalaut!; Kei Islands!; South New Guinea. — Annam, Malacca!, Philippines, North and Northeast Australia.
In sea.

Note. After examination of the type of *Dentex Peronii* C.V. in the Paris Museum we have come to the conclusion, that it is the same as Bleeker's *hypselognathus*. There are not "plus de soixante" scales in the lateral line, as mentioned by the french authors, but about 50, as in other species of the genus.

2. **Nemipterus sundanensis** (Blkr.)

Dentex tambulus Bleeker, Verh. Bat. Gen. XXIII (1849) 1850. Sparid. p. 12 (nec C.V.).
Dentex sundanensis Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873. Révision Dentex p. 15. Atl. Ichth. VIII, 1876—1877, p. 86.

D. X. 9. A. III. 7 (8). P. 2. 15. V. I. 5. Ll. 50. Ltr. $\begin{array}{c}3-3\frac{1}{2}\\\hline 1\\\hline 14\end{array}$.

Profile of head gently sloping in a curved line. The height of the head, measured in a vertical through hindborder of preoperculum, equals the length of the head without operculum. Height 3.7—3.8, 4.7 in length with caudal. Head 3.2—3.3, 4—4.2 in length with caudal. Eye 2.9—3.7, 1.1—1.4 in snout and equal to or somewhat more than flat interorbital space. Mouth somewhat oblique, maxillary reaching to below posterior nostril or somewhat further back, but not to below anterior border of eye. Narrow bands of teeth in the anterior part of both jaws, with an outer row of enlarged ones, continued laterally. Three strong canines on each side in anterior part of upper jaw and four much weaker ones on each side in lower jaw. Posterior border of suborbital very obtuse, the posterior border forming a more or less straight line, which, when produced, reaches the dorsal profile at the origin of the dorsal. Depth of suborbital less than vertical diameter of eye. Preoperculum with the naked limb as deep as the scaly part, its hindborder smooth. Scales beginning on head above posterior part of eye with an ill-defined temporal band of 6 or 7 rows of scales. Dorsal spines flexible. The 4th to 6th longest, as long as snout and half horizontal diameter of eye together. The last spine as long as snout. Membrane between dorsal spines scarcely emarginate. Soft dorsal rounded, scarcely less high than spinous part. First anal spine about half length of second, which is slightly shorter than third. Third spine equals horizontal diameter of eye. Inferior border of soft anal somewhat rounded, the fin pointed behind. Pectorals half length of snout shorter than head. Ventrals broken at tip in the typical specimens. Caudal deeply forked, the lobes pointed. Least height of caudal peduncle 1.7 in its length. Colour of preserved specimens brownish above, silvery below. Fins yellowish. Length 185 mm (Description made after the typical specimens of Bleekers collection in the Leiden Museum).

Nomen indig.: Passir-passir, Gurisi merah (Malay).

Habitat: Java (Batavia); Banka; Biliton; Celebes (Badjoa, Lagusi).

In sea.

Note. Closely allied to *N. hypselognathus,* from which it differs in having a more slender body and a more pointed head. *Dentex furcosus* C.V. (Hist. Nat. Poissons VI. 1830, p. 244), is still more slender, but otherwise very near *sundanensis.* We examined the typical specimens from Ceylon in the Paris-Museum. They differ from *sundanensis* by having the height 4—4.2, 5.1—5.4 in length with caudal. The height of the head, measured in vertical through hindborder of preoperculum is much less than the length of the head without operculum. The caudal is deeply forked, with pointed lobes, but without filaments.

3. **Nemipterus ovenii** (Blkr.)

Dentex Ovenii Bleeker, Nat. Tijdschr. Ned. Indië VII, 1854, p. 246.
Synagris ovenii Günther, Cat. Brit. Mus. I. 1859, p. 375.
Dentex Ovenii Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873. Révision Dentex, p. 14. Atl. Ichth. VIII, 1876—1877, p. 86.
Nemipterus ovenii Jordan & Seale, Bull. Bur. Fish. XXVI (1906), 1907, p. 21.
Synagris ovenii Fowler, Bull. U. S. Nat. Mus. Vol. XII, 1933, p. 111 (sine syn).

D. X. 9. A. III. 7. P. 2. 14. V. I. 5. Ll. 50. Ltr. $\begin{array}{c}3\frac{1}{2}\\ \hline 1\\ \hline 12\end{array}$.

Profile of head gently sloping in a curved line. Height of head, measured in vertical through hindborder of preoperculum, slightly less than length of head without operculum. Height 3.7—3.8, 4.5—5 in length with caudal. Head 3.2—3.3, 4—4.2 in length with caudal. Eye 3—3.1, slightly less than snout. Interorbital space 1.3 in eye. Mouth somewhat oblique. Maxillary reaching not quite to below frontborder of eye. Narrow bands of small teeth in anterior part of jaws, with an outer series of enlarged ones. Three strong curved canines on each side of upper jaw, four smaller ones on each side of lower jaw. Suborbital less deep than vertical diameter of eye, its posterior angle obtuse, its hindborder forming a more or less straight line, which, when produced, reaches dorsal profile in anterior part of dorsal fin. Naked limb of preoperculum scarcely less deep than scaly part. Hindborder of preoperculum smooth. Dorsal spines flexible. First dorsal spine slightly shorter than second, second slightly shorter than third spine. Fourth to sixth spines longest, somewhat longer than postorbital part of head. Membrane between dorsal spines scarcely emarginate. Soft dorsal rounded, lower than spinous part. First anal spine half length of second. Second and third spines subequal, slightly less than horizontal diameter of eye. Soft anal slightly less deep than soft dorsal, its inferior border straight, the fin truncate behind. Pectorals and ventrals broken in the typical specimens, but pectorals at least longer than head without snout. Caudal deeply forked. Least height of caudal peduncle 1.6 in its length. Colour of preserved specimens reddish brown above, silvery below. In life five darkish saddle-like patches on the back below dorsal. Fins yellowish. Length 187 mm (Typical specimens in the Leiden Museum seen by us).

Habitat: Celebes (Makassar!). — Philippines, Formosa. In sea.

Note. This species is very closely allied to *N. sundanensis.* We compared the typical specimens of both species in the Leiden Museum and found as only difference that the head is somewhat more pointed in *ovenii.* The chief difference, viz. the presence of vertical dark blotches in last named species, is not apparent in preserved specimens, at least not in the typical specimens, which have now been preserved in alcohol for more than 80 years. It is noteworthy, that in the first description Bleeker does not mention these blotches.

4. **Nemipterus hexodon** (Q.G.)

Dentex hexodon Quoy & Gaimard, Voyage Uranie & Physicienne, Zool. Poissons, 1824, p. 301.

Dentex ruber Lesson, Voyage Coquille, Poissons, 1826—1830, p. 187.

Dentex hexodon Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 243.
Dentex taeniopterus Cuvier & Valenciennes, ibid. p. 246.
Dentex ruber Cuvier & Valenciennes, ibid. p. 247.
Dentex taeniopterus Bleeker, Verh. Bat. Gen. XXIII (1849), 1850. Spar. p. 4.
Synagris taeniopterus Günther, Cat. Brit. Mus. I, 1859, p. 374.
Dentex (Synagris) notatus Day, Proc. Zool. Soc. London 1870, p. 684. Fishes of India, 1875—1888, p. 93.
Dentex taeniopterus Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873. Révision Dentex, p. 7. Atl. Ichth. VIII, 1876—1877, p. 83.
Dentex isacanthus Bleeker, ibid. p. 13. Ibid. p. 85.
Synagris taeniopterus Macleay, Descr. Cat. Austr. Fish I, 1881, p. 84.
Synagris notatus Ramsay & Ogilby, Proc. Linn. Soc. New S. Wales (2) I, 1886, p. 84.
Synagris taeniopterus Day, Fauna of Br. India, Fishes I, 1889, p. 529.
Synagris isacanthus Boulenger, Proc. Zool. Soc. London 1889, p. 338.
Synagris ruber Sauvage, Poissons de Madagascar 1891, p. 180.
Dentex (Anemura) notatus Fowler, Journ. Acad. Nat. Sc. Philadelphia (2) XII, 1904, p. 527.
Nemipterus taeniopterus Jordan & Seale, Bull. Bur. Fish. XXVI (1906), 1907, p. 21.
Synagris isacanthus M. Weber, Siboga Exp. Fische 1913, p. 284.
Synagris ruber de Beaufort, Bijdr. Dierk. Afl. XIX, 1913, p. 122.
Synagris isacanthus Fowler, Bull. U. S. Nat. Mus. Vol. XII, 1933, p. 89.
Synagris furcosus Fowler, ibid. p. 97 (nec C.V.).

D. X. 9 (10). A. III. 7. P. 2. 14—15. V. I. 5. Ll. 46—50. Ltr. $\dfrac{3\frac{1}{2}}{\dfrac{1}{11-12}}$.

Profile of head gently sloping from snout to nape. The height of the head, measured in the vertical through hindborder of preoperculum, almost equal to length of head. Height 2.9—3.2, 3.7—4 in length with caudal. Head 3.1—3.2, 3.9—4 in length with caudal. Eye 3.4—4.4, 1.4—1.6 in snout and equal to flat interorbital space. Mouth somewhat oblique; maxillary reaching to below frontborder of eye or of pupil. Jaws equal. Narrow bands of small pointed teeth in the anterior part of the jaws, laterally a row of about 20—30 caninoid ones on each side, continued anteriorly into an outer row of about 6 distant canines. Suborbital rectangular, its hindborder forming a more or less straight line, which, when produced, reaches the dorsal profile about 5 scales before origin of dorsal; its depth about equal to eye. Naked limb of preoperculum almost twice in that of the scaly part. Hindborder of preoperculum denticulate or somewhat crenulate only. Scales beginning on head slightly before hindborder of eyes with a rather well-defined temporal band of 4 rows of scales. Dorsal spines slender and flexible, but pungent. The first spine about three fourths of the second. Second to sixth or fourth to seventh spines subequal, as long as postorbital part of head or somewhat shorter. Tenth spine equal in length to second one. Soft dorsal slightly higher than spinous part, pointed posteriorly. Anal spines slender, first less than half length of second, which equals diameter of eye. Third spine slightly longer than second, but less than soft rays. Soft anal rounded anteriorly, pointed behind. Pectorals one diameter of eye or of pupil shorter than head. Ventrals with the first ray produced, somewhat shorter than pectorals. Caudal deeply forked, the lobes pointed. Least height of caudal peduncle 1.6 to nearly twice in its length. Colour of preserved specimens light reddish brown, lighter below. Longitudinal series of scales on sides and belly silvery, forming broad bands. Fins hyaline. Length 260 mm.

Nomen indig.: Gurisi merah, Passir-passir (Malay), Gresik (Javan.), Djamben (Sundan.).

Habitat: Singapore; Sumatra (Telok Betong, Tandjong, Padang, Siboga); Java (Batavia, Tjiringin, Anjer, Pasuruan, Besuki): Celebes (Makassar!, Bonthain, Badjoa); Saleyer!; Flores!; Rotti!; Batjan; Ambon; Timor!; Waigeu!; South New Guinea. — Zanzibar, Muscate, British India, Andamans, Siam, China, Malacca!; Philippines, Australia.

In sea.

Note. After comparing typical specimens of Bleeker's *Dentex isacanthus* with *D. taeniopterus* in the Leiden Museum, we came to the conclusion, that they do not differ. The form of the suborbital is the same in both and the number of teeth in the outer row of the upper jaw is equally variable in *isacanthus* as well as in *taeniopterus*. We studied the type of *Dentex hexodon* in the Paris Museum and found no difference with Bleeker's *isacanthus* and *taeniopterus*. The type of *Dentex ruber*, which we also examined in the Paris Museum, is a young specimen of the same species, with a relatively larger eye and therefore also relatively shorter snout.

5. **Nemipterus celebicus** (Blkr.)

Dentex celebicus Bleeker, Nat. Tijdschr. Ned. Indië VII, 1854, p. 245.
Synagris celebicus Günther, Cat. Brit. Mus. I, 1859, p. 377.
Synagris tolu Klunzinger, Verh. zool. bot. Gesell. Wien XX, 1870, p. 767 (nec C.V.).
Dentex celebicus Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873, Révision Dentex, p. 19. Atl. Ichth. VIII, 1876—1877, p. 88.
Synagris celebicus Sauvage, Bull. Soc. Philom. (7) V, 1881, p. 105.

Synagris celebicus Klunzinger, Fische des rothen Meeres I, 1884, p. 36.
Synagris celebicus Pfeffer, Jahrb. d. Hamb. Wiss. Anstalt. X, 1893, p. 6.
Nemipterus celebicus Herre, Notes Fishes Zool. Museum Stanford Univ. 1931, p. 55.

D. X. 9. A. III. 7 (8). P. 2. 14. V. I. 5. Ll. 49—51. Ltr. $\begin{array}{c}3-3\frac{1}{2}\\ \hline 1\\ \hline 9-10\end{array}$.

Profile of head slightly convex. Height of head, measured in vertical through hindborder of preoperculum equal to length of head without operculum. Snout rather pointed. Height 3.9, 4.8 in length with caudal. Head 3.4, 4 in length with caudal. Eye 3.4, 1.3 in snout. Interorbital space scarcely convex, nearly flat, 1.2 in eye. Mouth somewhat oblique; maxillary reaching to below frontborder of eye. Lower jaw slightly included. A very narrow band of small teeth in the upper jaw with an outer series on the sides of about 15 larger ones and six curved canines in front. In the lower jaw the band of small teeth is only developed anteriorly, with six distant canines in front of it and continued on the sides with a single row of about 9 curved caninoid teeth. Suborbital as high as vertical diameter of eye, its posterior angle rounded, its hindborder forming a more or less straight line, which, when produced, reaches the dorsal profile about 4 or 5 scales before origin of dorsal. Naked limb of preoperculum somewhat deeper than half depth of scaly part. Hindborder of preoperculum slightly crenulated. Scales beginning on head with an ill-defined temporal band, the median point of which reaches anteriorly to above middle of eye. Dorsal spines rigid and pungent, the first, four fifths of the second, which is slightly shorter than the third. Third to fifth spines subequal, slightly shorter than the following spines, which are of almost equal length and as long as snout. Membrane between dorsal spines hardly emarginate. Soft dorsal as high as spinous part, its upperborder straight, somewhat rounded behind. First anal spine more than half length of second, which is slightly shorter than third and equal to eye. Soft anal rays longer than spines. Soft anal pointed behind, its lower border straight. Pectorals half length of snout shorter than head. Ventrals, with the first ray prolonged, as long as pectorals. Caudal deeply forked, the lobes pointed. Least height of caudal peduncle three fifths of its length. Colour of preserved specimen reddish above, silvery below. Fins hyaline or light yellowish, the soft anal with traces of two narrow yellow longitudinal bands. In life a broad yellow band from snout through eye to base of caudal, and two narrow longitudinal yellow bands on dorsal and anal. Length 197 mm (Description made after a specimen from the Dutch East Indias in the Amsterdam Museum).

Habitat: Celebes (Makassar). — Zanzibar, Red Sea, China, Philippines, Louisade Archipelago.

In sea.

6. **Nemipterus nemurus** (Blkr.)

Dentex nemurus Bleeker, Act. Soc. Ind. neerl. II, 1857. Achtste bijdrage vischfauna Ambon, p. 49.

Synagris nemurus Günther, Cat. Brit. Mus. I, 1859, p. 378.

Dentex nemurus Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873. Révision Dentex, p. 18. Atl. Ichth. VIII, 1876—1877, p. 87.

Nemipterus nemurus Evermann & Seale, Bull. Bureau Fish. XXVI (1906), 1907, p. 81.

Dentex nemurus Fowler, Mem. B. P. Bishop Museum X, 1928, p. 220.

Synagris nemurus Fowler, Bull. U. S. Nat. Museum Vol. XII, 1933, p. 90.

D. X. 9. A. III. 7. P. 2. 14. V. I. 5. Ll. 51—52. Ltr. $\begin{array}{c}3\frac{1}{2}\\ \hline 1\\ \hline 11\end{array}$.

Rostrofrontal profile convex. Snout rather blunt. Height of head, measured in vertical through hindborder of preoperculum, somewhat more than length of head without operculum. Height 3.7—3.8, 4.4 in length with caudal 1). Head 3.2, 4 in length with caudal 1). Eye 3—3.2, 1.1 in snout. Interorbital space somewhat concave, 1.6 in eye. Mouth somewhat oblique, maxillary reaching slightly beyond vertical through frontborder of eye, or frontborder of pupil. Lower jaw slightly included. Small teeth in narrow bands in the upper jaw with an outer series of about 27 enlarged ones laterally and three curved canines anteriorly on each side. In the lower jaw 4 or 5 rows of small teeth anteriorly and a lateral row of about 20 larger ones. In front 4 or 5 canines on each side, smaller than those of the upper jaw. Posterior angle of suborbital rounded. Height of suborbital equal to half of vertical diameter of eye, its hindborder forming a more or less straight line, which, when produced, reaches the dorsal profile about 6 to 8 scales before origin of dorsal. Naked limb of preoperculum half as deep as scaly part. Hindborder of preoperculum crenulated. Scales beginning on head above hinder half of eyes with an indistinct temporal band of about 5 scales. Dorsal spines stiff and pungent. The first more than half length of the second, which is shorter than third. Third and fourth spines subequal, somewhat shorter than fifth. Fifth to tenth spines almost equal, the last spines only slightly longer and

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1) Excluding the filamentous prolongation of that fin.

one third of horizontal diameter of eye longer than postorbital part of head. Membrane between dorsal spines scarcely emarginate. Soft dorsal as high as spinous part, pointed behind. First anal spine half length of second, which is slightly shorter than third. Third spine as long as horizontal diameter of eye. Soft anal deeper than spinous part, scarcely less deep than soft dorsal, pointed behind. Pectorals a little less than length of head; ventrals, with the first ray produced, somewhat shorter. Caudal deeply forked, the upper lobe produced into a filament. Least height of caudal peduncle 1.6 in its length. Colour of preserved specimen light reddish. Fins light reddish. Length 225 mm (Type of Bleeker's collection in the Leiden Museum seen by us).

Habitat: Singapore; Ambon; Obi; Waigeu. — Philippines, Malay Peninsula.
In sea.

7. **Nemipterus metopias** (Blkr.)

Dentex metopias Bleeker, Act. Soc. Sc. Indo-Neerl. II, 1857, Achtste bijdr. vischfauna Ambon, p. 51.
Synagris metopias Günther, Cat. Brit. Mus. I, 1859, p. 376.
Dentex metopias Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873, Révision Dentex, p. 16. Atl. Ichth. VIII, 1876—1877, p. 87.
?*Nemipterus metopias* Jordan & Seale, Bull. Bur. Fish. XXVI (1906), 1907, p. 22.
Synagris metopias Fowler, Bull. U. S. Nat. Mus. Vol. XII, 1933, p. 89.

D. X. 9. A. III. 7. P. 2. 14. V. I. 5. Ll. 50. Ltr. $\begin{array}{c} 3\frac{1}{2} \\ \hline 1 \\ \hline 10-11 \end{array}$.

Profile of head convex, snout rather blunt. Height of body measured in vertical through hindborder of preoperculum, equal to or slightly less then length of head without operculum. Height 4.1—4.4, 5.2—5.3 in length with caudal. Head 3.3—3.4, 4.1—4.3 in length with caudal. Eye 2.9—3.1, slightly more than snout. Interorbital space very sligthly convex, almost flat, 1.3 in eye. Mouth somewhat oblique; maxillary reaching to below frontborder of eye. Jaws equal. A very narrow band of small teeth in the anterior part of the jaws, continued laterally in a single row of about 15 larger teeth. In the upper jaw, before the band of teeth, eight strong curved canines; in the lower jaw 7 almost straight caninoid ones. Suborbital low, its lower border slightly emarginate, its height less than half diameter of eye; its posterior angle rounded and its hindborder forming a more or less straight line, which, when produced, reaches the dorsal profile at a point about

5 scales before origin of dorsal. Preoperculum with 3 transverse rows of scales, its naked limb half as deep as the scaly part. Hindborder of preoperculum finely denticulate. Scales beginning on head with a supra-temporal band of about 6 rows of scales, the median point of which reaches anteriorly to between middle of eyes. Dorsal spines stiff and pungent, the first three fourths of second, which is as long as third. Fourth and fifth slightly longer, sixth to tenth still somewhat longer, subequal and somewhat more than postorbital part of head. The membrane between the spines scarcely emarginate. Soft dorsal rounded, scarcely higher than spinous part. First anal spine half as long as second, which is a trifle shorter than third and somewhat less than diameter of eye. Soft anal with the lower border rounded, pointed behind, deeper than spinous part. Pectorals half length of snout shorter than head; ventrals with the first ray somewhat prolonged, equal to head without snout. Caudal deeply forked, the lobes pointed and more or less produced into filaments. Least height of caudal peduncle more than twice in its length. Colour of preserved specimens darkbrown above, silvery below, the two colours sharply separated on the sides. Fins light reddish, the tips of the caudal dark. Length 202 mm (Specimen of Bleeker's collection in the Amsterdam Museum seen by us).

Habitat: Ambon! — Philippines.
In sea.

8. **Nemipterus nematophorus** (Blkr.)

Dentex nematophorus Bleeker, Nat. Tijdschr. Ned. Indië V, 1853, p. 500.
Synagris nematophorus Günther, Cat. Brit. Mus. I, 1859, p. 379.
Dentex nematophorus Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873, Révision Dentex, p. 23. Atl. Icht. VIII, 1876—1877, p. 90.
Synagris nematophorus Fowler, Bull. U. S. Nat. Mus. Vol. XII, 1933, p. 113.

D. X. 9 (10). A. III. 7. P. 2. 15. V. I. 5. Ll. 47—48. Ltr. $\frac{3-3\frac{1}{2}}{\frac{1}{11}}$.

Height 3.2—3.3, 4.2 in length with caudal. Head 3.1—3.2, 4—4.1 in length with caudal. Height of head, measured in vertical through hindborder of preoperculum, half length of operculum less than length of head. Eye 3—3.4, somewhat more than snout. Interorbital space somewhat concave, 1.5—1.7 in eye. Mouth oblique; maxillary reaching almost to below frontborder of pupil. Narrow bands of teeth in the jaws, with a lateral outer row in the upper jaw of about 25 larger teeth, and 4 strong curved canines on each sides anteriorly. An outer row of 24 larger teeth of equal size in each ramus of the lower jaw, without canines anteriorly. Suborbital low, its depth half vertical diameter of eye, its posterior angle somewhat obtuse, its hindborder forming a more or less straight line, which, when produced, reaches dorsal profile 7—9 scales before origin of dorsal. Preoperculum denticulate behind, depth of the naked limb 1.5—2 in that of the scaly part. Scales beginning on head above posterior half of eye. Dorsal spines flexible, not pungent, the first and second the longest, produced into a long filament and longer than length of base of dorsal. Soft part of dorsal higher than spinous part, excepting the filaments, and rounded. First anal spine shorter than second, third longest, equal to horizontal diameter of eye. Soft anal slightly rounded below, pointed behind, less deep than soft dorsal. Pectorals almost as long as head. Ventrals somewhat shorter. Caudal deeply forked, the lobes pointed, the upper lobe produced into a filament. Least height of caudal peduncle 1.8 in its length. Colour of preserved specimens reddish brown above, silvery below. Fins yellowish. Length 250 mm (Description made after the typical specimens of Bleeker's collection in the Leiden Museum).

Habitat: Sumatra (Padang, Siboga); Nias; Borneo (Sandakan); North Celebes. — Philippines.

In sea.

9. **Nemipterus tolu** (C.V.)

Dentex tolu Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 249.
Dentex tolu Bleeker, Verh. Bat. Gen. XXIII (1849), 1850. Spar. p. 13.
Dentex mulloides Bleeker, Nat. Tijdschr. Ned. Indië III, 1852, p. 576.
Synagris mulloides Günther, Cat. Brit. Mus. I, 1859, p. 374.
Dentex obtusus Bleeker, Acta Soc. Sc. Indo-Neerl. VIII, 1860, Dertiende bijdr. vischf. Celebes, p. 27.
Dentex tolu Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873, Révision Dentex, p. 20.
Dentex mulloides Bleeker ibid. p. 22.
Synagris tolu Day, Fishes of India 1875—1888, p. 91.
Dentex tolu Bleeker, Atl. Ichth. VIII, 1876—1877, p. 88.
Dentex mulloides Bleeker ibid. p. 89.
Synagris tolu Sauvage, Poissons de Madagascar 1891, p. 179.
Dentex tolu Fowler, Journ. Acad. Nat. Sc. Philadelphia (2) XII, 1904, p. 527.
Nemipterus tolu Jordan & Seale, Bull. Bur. Fish. XXVI (1906), 1907, p. 22.
Synagris tolu M. Weber, Siboga Exp. Fische, 1913, p. 283.
Nemipterus mulloides Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, p. 36.
Synagris tolu Fowler, Bull. U. S. Nat. Mus. Vol. XII, 1933, p. 114.
Synagris mulloides Fowler, ibid. p. 115.

D. X. 9. A. III. 7. P. 2. 14. V. I. 5. Ll. 49—50. Ltr. $\begin{array}{c}3\frac{1}{2}\\ \hline 1\\ \hline 12\end{array}$.

Dorsal profile evenly convex from snout to dorsal. Height of head, measured in vertical through hindborder of preoperculum, less than half length of operculum shorter than length of head. Height 3.1—3.6, 3.8—4.8 in length with caudal. Head 3.4—3.8, 4.3—4.8 in length with caudal. Eye 2.9—3, equal to or somewhat more or less than snout. Interorbital space slightly concave, 1.3—1.4 in eye. Mouth somewhat oblique; maxillary reaching to below anterior border of eye or slightly farther. Jaws equal. A few rows of conical teeth in the anterior part of the upper jaw, tapering into a single row of about 18 teeth laterally. Six moderate curved canines in front of the upper jaw. Two irregular rows of pointed teeth in the lower jaw, without canines anteriorly, but some of the lateral teeth are more or less caninoid. Depth of suborbital one half or two thirds of vertical diameter of eye. Posterior angle of suborbital very obtuse and rounded, its hindborder forming a more or less straight line, which, when produced, reaches the dorsal profile about at origin of dorsal. Preoperculum with three transverse rows of scales, the depth of the naked limb twice or nearly twice in that of the scaly part. Hindborder of preoperculum smooth or slightly crenulate, with some minute teeth at edge. Scales beginning on head above middle or posterior half of eye with an ill-defined supra-temporal band of about 4 scales. Dorsal spines flexible, not pungent; the fourth to-sixth spines longest, equal to snout and eye together or to snout and half eye in small specimens. The membrane between the spines deeply emarginate. Soft dorsal rounded, conspicuously lower than spinous part. Anal spines weak, the first half length of second, the third longest, equal to eye. Soft anal scarcely deeper than spinous part, rounded below, pointed behind. Pectorals and ventrals, with the first ray produced, subequal, as long as head without snout or somewhat longer. Caudal deeply forked. Least height of caudal peduncle 1.7—1.8 in its length. Colour of preserved specimens reddish brown above, silvery below. Fins light yellowish. Length 215 mm (Specimens of *N. tolu* and *N. mulloides* of Bleeker's collections in the Leiden and Amsterdam Museum seen by us).

Habitat: Singapore; Sumatra (Benkulen, Trussan, Padang, Priaman, Siboga); Nias!; Banka; Java (Batavia, Bantam); Celebes (Makassar!); Sumbawa, Ambon; New Guinea. — East coast of Arabia, coast of British India, Siam, China, Formosa, Philippines, New Caledonia.

In sea.

Note. We examined the typical specimens of *Dentex tolu* in the Paris Museum as well as typical specimens of Bleeker's *mulloides* and *tolu* in the Leiden Museum and we come to the same conclusion as Sauvage, l.c. viz. that the two species have to be united. The type-specimen agrees in the height and the more or less crenulate hindborder of the preoperculum, with a few spines at its lower border; with *mulloides*, but in the height of the head is more like Bleeker's *tolu*.

10. **Nemipterus japonicus** (Bl.)

Sparus japonicus Bloch, Ausländ. Fische V, 1791, p. 110.
Cantharus filamentosus Rüppell, Atlas Reise N. Afrika. Fische 1828, p. 50.
Dentex bipunctatus Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 247.
Dentex tambulus Cuvier & Valenciennes, ibid, p. 249, p. 558.
?Spondyliosoma guliminda Cantor, Journ. Asiat. Soc. Bengal XVIII, 1850, p. 1032 (fide Day).
Dentex Blochii Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 176.
Synagris japonicus Günther, Cat. Brit. Mus. I, 1859, p. 378.
Synagris filamentosus Günther, l.c.
?Dentex guliminda Bleeker, Versl. Akad. Amsterdam XII, 1861, p. 71.
Dentex (Heterognathodon) filamentosus Steindachner, Sitzber. Akad. Wien, XX, 1870, p. 976.
Synagris filamentosus Klunzinger, Verh. zool. bot. Gesellsch. Wien, XX, 1870, p. 766.
Dentex Blochi Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873, Révision Dentex, p. 27. Atl. Ichth. VIII, 1876—1877, p. 90.
Synagris japonicus Day, Fishes of India 1875—1888, p. 92.
Synagris japonicus Klunzinger, Fische des rothen Meeres I, 1884, p. 36.
Dentex blochii Fowler, Journ. Acad. Nat. Sci. Philadelphia (2) XII, 1904, p. 527.
Nemipterus japonicus Jordan & Seale, Bull. Bur. Fish. XXVI (1906), 1907, p. 21.
Nemipterus japonicus Jordan & Richardson, ibid. XXVII (1907), 1908, p. 258.
Nemipterus japonicus Herre, Notes Fishes Zool. Mus. Stanford Univ. 1931, p. 55.
Euthyopteroma blochi Herre, l.c.
Synagris japonicus Borodin, Bull. Vanderbilt marine Mus. I, 1932, p. 83.
Synagris japonicus Fowler, Bull. U. S. Nat. Mus. Vol. XII, 1933, p. 101.

D. X. 9. (10). A. III. 7. P. 2. 15. V. I. 5. Ll. 48. Ltr. $\begin{array}{c}3-3\frac{1}{2}\\ 1\\ \hline 10-11\end{array}$.

Dorsal profile of head gently curved. Height of head, measured in vertical through hindborder of preoperculum scarcely less than length of head. Height 2.6—2.7, 3.3—3.5 in length with caudal 1)). Head 2.9—3, 3.6—3.9 in length with caudal 1)). Eye 3—3.7, 1.3 in

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1) Excluding the filamentous prolongation of the caudal.

snout in adults, more than snout in young ones. Interorbital space somewhat concave, 1.2 in eye. Mouth oblique; maxillary reaching to below anterior border of pupil. Jaws equal, but the chin somewhat prominent. A very narrow band of small teeth in the upper jaw, with an outer series of enlarged ones; the lateral ones about 30 in number in each side, the anterior ones longer and curved, increasing in size and becoming canines towards symphysis. In the lower jaw a very narrow band of small pointed curved teeth, tapering posteriorly, without canines or caninoids. Suborbital almost rectangular, the angle rounded, the depth less than vertical diameter of eye, the hindborder forming a more or less straight line, which, when produced, reaches the dorsal profile about 9 scales before origin of dorsal. Preoperculum with 3 transverse rows of scales, its naked limb half as deep as scaly part. Hindborder of preoperculum conspicuously denticulate. Scales beginning on head above middle of eyes. Dorsal spines rigid and pungent, first less than second, second less than third, almost equal to fourth. Fifth to tenth longest, subequal, as long as postorbital part of head. Membrane between dorsal spines scarcely emarginate. Soft dorsal slightly higher than spinous part, its upper border somewhat rounded, acutely rounded behind. First anal spine half length of second, which is somewhat shorter than third. Third spine equal to postorbital part of head. Soft anal rounded, about as deep as soft dorsal. Pectorals almost as long as head, ventrals, with the first ray produced, half length of snout shorter. Caudal deeply forked, the lobes pointed, the upper lobe generally produced into a long filament. Least height of caudal peduncle 1.6 in its length. Colour of preserved specimens silvery, back, upper part and sides of head with a reddish hue. An indistinct reddish patch on upper part of operculum. Each longitudinal row of scales on the body below lateral line marked by a narrow yellow longitudinal band, the upper one of which is broader, as also a band along base of dorsal. Fins hyaline. Anal with yellowish markings at base, forming one or two indistinct longitudinal bands. Length 270 mm (Typical specimens of *Dentex blochi* of Bleeker's collection in the Leiden Museum seen by us).

Habitat: Singapore; Sumatra (Tiku, Padang); Java (Batavia, Pasuruan); Solor Straits. — Zanzibar, Mauritius, Red Sea, Aden, coast of British India, Siam, Japan, China, Formosa, Philippines.

In sea.

Note. Bleeker made a mistake, when he described the preoperculum of *Dentex blochi* as smooth. It is distinctly denticulate in all the specimens of his collection in the Leiden and Amsterdam Museum. In the figure in the Atlas Ichthyologique the preoperculum is also represented as denticulate, as has already been observed by. Klunzinger. We have therefore united it with *japonicus*.

11. **Nemipterus oveniides** (Popta)

Nemipterus luteus Jordan & Seale, Bull. Bur. Fish. XXVI (1906), 1907, p. 21 (nec Bl. Schn.).
Nemipterus luteus Fowler, Proc. Acad. Nat. Sc. Philadelphia LXX, 1918, p. 36 (nec Bl. Schn.).
Nemipterus oveniides Popta, Zool. Med. Rijksmus. Leiden VI, 1921, p. 204.
Synagris luteus Fowler, Bull. U. S. Nat. Mus. Vol. XII, 1933, p. 113 (nec Bl. Schn.).

D. X. 8—9. A. III. 7. P. 2. 14—15. V. I. 5. Ll. 48. Ltr. $\begin{array}{c}3\\\hline 1\\\hline 11\end{array}$.

Height equal to head, 3.5—3.6. Height of head, measured in vertical through hindborder of preoperculum, half length of operculum less than length of head. Eye 2.9—3, about equal to snout. Interorbital space slightly concave, 1.1—1.2 in eye. Mouth scarcely oblique; maxillary reaching to below frontborder of eye. Narrow bands of teeth in anterior part of jaws, with an outer row of somewhat larger teeth in both jaws and three canines on each side anteriorly in the upper jaw. No canines in the lower jaw. Depth of suborbital two thirds of vertical diameter of eye. Hindborder of suborbital oblique, forming a more or less straight line, which, when produced, reaches the dorsal profile one scale before origin of dorsal. Depth of naked limb of preoperculum twice in that of the scaly part. Hindborder of preoperculum finely crenulate. Dorsal spines slender and flexible, not pungent. The membrane between the spines not much emarginate. Median spines longest, one half or three fourths of height of body. Third anal spine longest, less than vertical diameter of eye. Pectorals short, equal to head without snout. Ventrals, with the first ray somewhat produced, longer than pectorals. Caudal deeply forked. Least height of caudal peduncle 1.5 in its length. Colour of preserved specimens yellowish brown, with about 9 saddle-like dark patches on the back, the first on nape, the last on caudal peduncle. A dark blotch on operculum. Length 150 mm (One of the typical specimens in the Leiden Museum seen by us).

Habitat: Muna! — Philippines.
In sea (and fresh water?).

Note. We hardly doubt, that the specimens described and figured by Jordan & Seale and Fowler as *luteus* belong to this species, which is well characterized by its short pectoral and peculiar coloration. We don't know, why they associated their specimens with *Synagris luteus* (Bl. Schn.), which, according to the description, must be quite a different fish.

12. **Nemipterus marginatus** (C.V.)

Dentex marginatus Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 245.
Dentex nematopus Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 219.
Synagris nematopus Günther, Cat. Brit. Mus. I, 1859, p. 377.
Dentex nematopus Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873. Révision Dentex, p. 29. Atl. Ichth. VIII, 1876—1877, p. 91.
?Synagris bleekeri Day, Fishes of India 1875—1888, p. 92. Fauna of British India, Fishes I, 1889, p. 528.
?Synagris sp. aff. Bleekeri Duncker, Mitth. Naturh. Mus. Hamburg XXI, 1904, p. 150.
?Synagris blekeri Borodin, Vanderbilt marine Mus. I, 1932, p. 83.

D. X. 9. A. III. 7. P. 2. 14. V. I. 5. Ll. 51. Ltr. $\begin{array}{c}3\frac{1}{2}\\ \hline 1\\ \hline 11\end{array}$.

Rostrofrontal profile rather convex, snout rather blunt. Height of head, measured in vertical through hindborder of preoperculum, half length of operculum shorter than length of head. Height 3.3—3.4, 4.2—4.3 in length with caudal. Head 3.2—3.3, 4.1—4.2 in length with caudal. Eye 3.6, slightly less than snout. Interorbital space nearly flat, 1.2 in eye. Mouth oblique; maxillary reaching to below frontborder of eye. Lower jaw slightly included. A few rows of pointed teeth in the upper jaw, tapering into one row laterally, with an outer row of larger teeth, consisting of six curved canines anteriorly and about 20 much smaller teeth laterally. A row of conical, pointed teeth in the lower jaw, with an irregular inner row of smaller teeth near symphysis. Suborbital as high as half vertical diameter of eye, its angle rounded, its hindborder forming a more or less straight line, which, when produced, reaches the dorsal profile 8 or 9 scales before origin of dorsal. Preoperculum with 3 transverse rows of scales, its naked limb half as deep as scaly part. Hindborder of preoperculum finely denticulate. Scales beginning on head with an indistinct supra-temporal band of about 3 scales, the median point of which reaches anteriorly to above middle of eyes. Dorsal spines flexible and pungent, increasing in length from the first to the last, the difference between these two not more than half diameter of pupil. Tenth spine as long as snout and half eye together. Membrane between dorsal spines not emarginate. Soft dorsal somewhat higher than spinous part, pointed behind, the seventh ray being the longest and equal to snout and eye together. First anal spine more than half length of second, which is somewhat shorter than third and equal to diameter of eye. Soft anal deeper than spinous part, pointed behind, its lower border rounded. Pectorals almost as long as head. Ventrals, with the first ray produced into a long filament, which reaches to anal, equal to length of head. Caudal deeply forked, the lobes pointed. Least height of caudal peduncle almost twice in its length. Colour of preserved specimens salmon-red above, silvery below. Two yellow longitudinal bands, bordered above and below by a narrow violet line; the first from hindborder of operculum to upper part of caudal peduncle, the second from hindborder of preoperculum to middle of caudal peduncle. Dorsal and anal hyaline. Dorsal with three narrow longitudinal milky white lines. Caudal, pectorals and ventrals yellowish. Length 191 mm. (Types of *D. marginatus* C.V. in the Paris Museum examined by us).

Habitat: Java!; Celebes (Makassar!, Bulukomba). — Vanikolo!

Note. We have examined the typical specimens of *Dentex marginatus* C.V. from Vanikolo and Java in the Paris Museum. They have no true canines in the lower jaw and differ in no way from *D. nematopus* Blkr. In the largest specimen from Vanikolo the filament of the first ventral ray reaches on anal, in the much smaller specimen from Java it is also well developed, but does not reach so far.

13. **Nemipterus mesoprion** (Blkr.)

Dentex mesoprion Bleeker, Nat. Tijdschr. Ned. Indië IV, 1853, p. 255. Verh. Akad. Amsterdam XIII (1872), 1873, Révision Dentex, p. 30. Atl. Ichth. VIII, 1876—1877, p. 92.
Synagris mesoprion Machan, Ann. Naturh. Mus. Wien XLIV, 1930, p. 435.
Synagris mesoprion Fowler, Bull. U. S. Nat. Mus. Vol. XII, 1933, p. 105.

D. X. 9 (10). A. III. 7. P. 2. 14. V. I. 5. Ll. 45—47. Ltr. $\dfrac{3-3\frac{1}{2}}{\dfrac{1}{11}}$.

Height 3.2—3.5, 4—4.3 in length with caudal. Head 3.2—3.5, 4—4.3 in length with caudal. Height of head, measured in vertical through hindborder of preoperculum, half length of operculum less than length of head. Eye 3.1—3.4, equal to or slightly less than snout. Interorbital space somewhat concave, 1.5—1.6 in eye. Mouth oblique; maxillary reaching to below pupil. Narrow bands of teeth in anterior part of jaws, with an outer series of somewhat larger ones. Four to six canines anteriorly in each ramus of the upper jaw, no canines in the lower jaw. Height of suborbital equal to vertical diameter of eye, its hindborder forming a more or less straight line, which, when produced, reaches the dorsal profile about 6 scales before origin of dorsal. Preoperculum denticulate behind, the naked limb not quite twice as narrow as the scaled part. Dorsal spines rigid and pungent, their membrane scarcely emarginate. Fourth to tenth spines subequal, longer than the anterior ones and equal to postorbital part of head. Soft dorsal rounded, somewhat higher than spinous part. First anal spine about half as long as second. Third spine slightly longer, equal to horizontal diameter of eye. Soft anal deeper than spinous part, but less deep than soft dorsal, rounded below, pointed behind. Pectorals somewhat shorter than head. Ventrals, with the first ray produced, slightly shorter than head without snout. Caudal forked. In three specimens from Malacca the upper caudal lobe is produced into a long filament. Least height of caudal peduncle 1.8—1.9 in its length. Colour of preserved specimens reddish brown, silvery below. Fins hyaline, traces of two longitudinal bands on anal. Length 165 mm (Description made after the typical specimen, seen by us in the Leiden Museum).

Habitat: Singapore; Sumatra (Padang, Ulakan, Priaman). — Straits of Malacca!

In sea.

14. **Nemipterus tambuloides** (Blkr.).

Dentex tambuloides Bleeker, Nat. Tijdschr. Ned. Indië IV, 1853, p. 465. Verh. Akad. Amsterdam XIII (1872), 1873. Révision Dentex, p. 31. Atl. Ichth. VIII, 1876—1877, p. 92.

Synagris tambuloides Fowler, Bull. U. S. Nat. Mus. Vol. XII, 1933, p. 105.

D. X. 9 (10). A. III. 7 (8). P. 2. 15. V. I. 5. Ll. circa 50. Ltr. $\begin{array}{c}3\\ \hline 1\\ \hline 11\end{array}$.

Height almost 4, $4^{3}/_{4}$ in length with caudal. Head $3^{3}/_{5}$, $4^{1}/_{8}$ in length with caudal. Height of head much more than length of head without operculum. Eyes somewhat more than 3, more than snout. Interorbital space $^{3}/_{5}$ of eye. Suborbital not emarginate, obtusely rounded behind, its hindborder convex and oblique, its depth slightly less than vertical diameter of eye. Maxillary reaching to below pupil. Teeth in the upper jaw in several rows, anteriorly, with an outer row of enlarged ones; in one row laterally. On each side 5 small curved canines in the upper jaw, no canines in the lower jaw. Hindborder of preoperculum very finely serrate. Naked limb of preoperculum only slightly less deep than scaled part. Dorsal spines rigid and pungent; the membrane between the spines slightly emarginate. The last five spines subequal, more than twice lower than height of body. Soft dorsal scarcely higher than spinous part, somewhat rounded. Third anal spine longest, shorter than first ray. Soft part of anal convex anteriorly, pointed behind. Pectorals slightly longer than ventrals, and slightly shorter than head. Caudal deeply forked, the lobes pointed. Colour rosy. Several longitudinal yellow or golden bands from snout to caudal. Fins rosy or pinkish hyaline. Dorsal above with two longitudinal violaceous lines, anal with a median longitudinal yellow band. Length 164 mm (After Bleeker, not seen by us).

Nomen indig.: Passir-passir and Gurisi merah (Malay).
Habitat: Java (Batavia); Celebes (Badjoa).
In sea.

Note. All species described by Bleeker in the genus *Dentex* (= *Nemipterus*) from the Indo-australian Archipelago are represented in his collection in the Leiden Museum, with exception of this one. As it does not appear in the catalogue of the sale of his collections after his death, the specimens must have been lost already during his life. As far as we know, the species has never been found again.

15. **Nemipterus balinensis** (Blkr.)

Dentex balinensis Bleeker, Nat. Tijdschr. Ned. Indië XVII, 1858—1859, p. 155. Verh. Akad. Amsterdam XIII (1872), 1873. Révision Dentex, p. 38. Atl. Ichth. VIII, 1876—1877, p. 95.

D. X. 9 (10). A. III. 7 (8). P. 2. 15. V. I. 5. Ll. about 50. Ltr. $\dfrac{3}{\dfrac{1}{11}}$.

Height 3.7, 4.8 in length with caudal. Head 3.3, 4.3 in length with caudal. Height of head, measured in vertical through hindborder of preoperculum, equal to length of head without operculum. Eye large, 2.3. Snout blunt, 1.7 in eye. Interorbital space more than twice in eye. Maxillary reaching to below anterior part of eye. Narrow bands of teeth in both jaws, with an outer row of enlarged ones. Four to five canines on each side anteriorly in the upper jaw. No canines in lower jaw. Suborbital very narrow, emarginate, its depth thrice in vertical diameter of eye, its hindborder forming a more or less straight line, which, when produced, reaches the dorsal profile about 8 scales before origin of dorsal. Hindborder of preoperculum distinctly denticulate. Depth of naked limb of preoperculum about 2.5 in the scaled part. Dorsal spines rigid and pungent. The membrane between the spines scarcely emarginate. Fourth to last spines subequal, longer than anterior ones and equal to horizontal diameter of eye. Soft dorsal about equal to spinous part in height. Anal spines rather strong, specially the second one. First, half length of second, which is scarcely shorter than third. Third less than vertical diameter of eye. Pectorals almost as long as head. Ventrals shorter. Caudal forked. Colour reddish-brown, more or less silvery below, with traces of a broad longitudinal yellow band. Fins hyaline. Length 151 mm (Description made after the type, seen by us in te Leiden Museum).

Habitat: Bali!

In sea.

16. **Nemipterus balinensoides** (Popta)

Synagris balinensoides Popta, Zweite Fortsetzung Beschr. neue Fischarten der Sunda Exp. Leiden 1918, p. 7.

D. X. 9. A. III. 7. P. 2. 14. V. I. 5. Ll. 50. Ltr. $\frac{3}{\frac{1}{11}}$.

Height 5, 6.5 in length with caudal. Head 3.4, 4.4 in length with caudal. Height of head, measured in vertical through hindborder of preoperculum, equal to length of head without operculum. Eye 2.9, slightly more than snout and than interorbital space. Maxillary reaching to below first fourth of eye. Small teeth in narrow bands in the jaws, tapering to two rows on the sides of the upper jaw and to one row only in the lower jaw. Suborbital very narrow, emarginate, its depth four times in vertical diameter of eye, its hindborder forming a more or less straight line, which, when produced, reaches the third dorsal spine. Hindborder of preoperculum finely denticulate. Depth of naked limb of preoperculum twice in the scaly part. Dorsal spines slender, but not flexible. Third to eighth spines of equal length, 1.7 in height of body. Anal spines slender, first more than half length of second. Pectorals short, scarcely more than snout and eye together. Ventrals as long as pectorals. Caudal deeply forked, the upper lobe the longer. Colour of preserved specimen reddish-brown, lighter on the sides, suggesting a light longitudinal band. Length of single specimen known 97 mm.

Habitat: Sumbawa, Brang Nee river (in fresh water?).

Note. We have to thank Miss A. P. C. de Vos, who examined the type in the Senckenberg Museum, Frankfurt a.M., for information about this species.

17. **Nemipterus sumbawensis** (Blkr.)

Dentex sumbawensis Bleeker, Nat. Tijdschr. Ned. Indië XIX, 1859, p. 439. Verh. Akad. Amsterdam XIII (1872), 1873. Révision Dentex, p. 35. Atl. Ichth, VIII, 1876—1877, p. 94.

Euthyopteroma sumbawensis Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 55.

D. X. 9 (10). A. III. 7 (8). P. 2. 16. V. I. 5. Ll. 47. Ltr. $\begin{array}{c}3\\\hline 1\\\hline 10\end{array}$.

Height 3.9, 4.6 in length with caudal. Head 3.3, 4.2 in length with caudal. Height of head, measured in vertical through hindborder of preoperculum, equal to length of head without operculum. Eye 3.1, equal to snout. Interorbital space 1.4 in eye. Mouth oblique, maxillary reaching a little further than frontborder of eye. Narrow bands of teeth in anterior part of jaws. In the upper jaw an outer row of somewhat enlarged teeth and 3 moderate curved canines anteriorly on each side. In the lower jaw an outer row of rather strong enlarged teeth, those in front somewhat shorter. No canines in lower jaw. Suborbital low, emarginate, its depth more than twice in vertical diameter of eye, its hindborder forming a more or less straight line, which, when produced, reaches the dorsal profile 6 scales before origin of dorsal. Hindborder of preoperculum rugose or slightly denticulate. Depth of naked limb of preoperculum about twice in scaly part. Dorsal spines rigid and pungent. The membrane between the spines slightly emarginate. Spines slightly increasing in length from fourth to the last, which is as long as snout and half eye together. Soft dorsal higher than spinous part, rounded. First anal spine more than half length of second. Third longest, equal to horizontal diameter of eye. Soft anal somewhat pointed behind, less deep than soft dorsal. Pectorals half length of snout shorter than head. Ventrals with the first ray produced, slightly shorter. Caudal rather deeply forked. Colour of preserved specimens reddish-brown above, silvery below. Fins yellowish. Length 154 mm (Description made after the type, seen by us in the Leiden Museum).

Habitat: Sumbawa! — Philippines.
In sea.

18. **Nemipterus zysron** (Blkr.)

Dentex zysron Bleeker, Nat. Tijdschr. Ned. Indië XII, 1856, p. 219.
Synagris zysron Günther, Cat. Brit. Mus. I, 1859, p. 375.
Dentex zysron Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873. Révision Dentex, p. 37. Atl. Ichth. VIII, 1876—1877, p. 94.

D. X. 9 (10). A. III. 7 (8). P. 2. 14. V. I. 5. Ll. circa 47. Ltr. $\begin{array}{c}3-3\frac{1}{2}\\ \hline 1\\ \hline 10\end{array}$.

Height 4, 5 in length with caudal. Head 3.7, 4.7 in length with caudal. Height of head, measured in vertical through hindborder of preoperculum slightly more than length of head without operculum. Eye 3, equal to snout. Interorbital space 1.5 in eye. Mouth oblique; maxillary reaching to below frontborder of eye. Narrow bands of teeth in anterior part of jaws. In the upper jaw an outer row of somewhat enlarged teeth and 3 moderate canines anteriorly on each side. In the lower jaw an outer row of rather strong, laterally almost caninoid teeth, those in front somewhat shorter. No canines in lower jaw. Suborbital emarginate, its depth less than twice in vertical diameter of eye, its hindborder rather oblique, forming a more or less straight line, which, when produced, reaches the dorsal profile one scale before origin of dorsal. Hindborder of preoperculum distinctly denticulate. Depth of naked limb of preoperculum about twice in the scaly part. Dorsal spines rigid and pungent. The membrane between the spines slightly emarginate. Five posterior spines subequal, longer than the anterior ones and equal to postorbital part of head. Soft dorsal as high as spinous part. Third anal spine longest, less than soft part of anal, which is acutely pointed behind. Pectorals almost as long as head, ventrals slightly shorter, their first ray produced. Caudal rather deeply forked. Colour of preserved specimen reddish-brown, more or less silvery below. Fins yellowish. Length 165 mm (Description made after the type in the Leiden Museum, seen by us).

Habitat: Nias!; Sumbawa.
In sea.

19. **Nemipterus upeneoides** (Blkr.)

Dentex upeneoides Bleeker, Nat. Tijdschr. Ned. Indië III, 1852, p. 725.
Synagris upeneoides Günther, Cat. Brit. Mus. I, 1859, p. 375.
Dentex upeneoides Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873. Révision Dentex, p. 33. Atl. Icht. VIII, 1876—1877, p. 92.
Synagris upeneoides Klunzinger, Sitzber. Akad. Wien LXXX, 1880, p. 351.
Nemipterus upeneoides Seale, Philip. Journ. Science V, 1910, p. 275.

D. X. 9. A. III. 7. P. 2. 14. V. I. 5. Ll. 48. Ltr. $\begin{array}{c} 3-3\frac{1}{2} \\ \hline 1 \\ \hline 12-13 \end{array}$.

Profile of head convex. Height 3.3, 4—4.4 in length with caudal. Head 3.2—3.5, 4.2—4.3 in length with caudal. Height of head, measured in vertical through hindborder of preoperculum, equal to length of head without operculum. Eye 2.7—3.1, about equal to snout. Interorbital space somewhat concave, 1.3—1.4 in eye. Mouth somewhat oblique; maxillary reaching to below frontborder of eye. Narrow bands of teeth in anterior part of jaws. Upper jaw with an outer row of about 21 enlarged teeth and 3 moderate canines anteriorly on each side. Lower jaw without canines but with an outer row of 16 enlarged teeth, somewhat stronger than those of the upper jaw. Depth of suborbital somewhat less than vertical diameter of eye. Hindborder of suborbital oblique, forming a more or less straight line, which, when produced, reaches the origin of the dorsal. Hindborder of preoperculum smooth, its naked limb nearly as deep as the scaly part. Dorsal spines flexible. The membrane between the spines scarcely emarginate. Median spines longest, equal to snout and half diameter of eye together. Soft dorsal somewhat lower than spinous part, slightly rounded. Anal spines weak; the first equal to half eye, the third longest, as long as horizontal diameter of eye. Soft part of anal lower than that of dorsal. Pectorals half length of snout shorter than head. Ventrals equal to snout and eye together. Caudal deeply forked. Least height of caudal peduncle 1.9 in its length. Colour of preserved specimens reddish-brown, silvery above. Fins hyaline. Length 160 mm (Typical specimens of Bleeker's collection in the Leiden Museum seen by us).

Habitat: Nias; Banka; Borneo (Sandakan); Celebes (Makassar!, North Celebes). — Queensland.

In sea.

20. **Nemipterus gracilis** (Blkr.)

Latilus upeneoides Bleeker, Nat. & Geneesk. Arch. Ned. Indië II (3), 1845, p. 523 (nomen nudum).

Dentex ruber Bleeker, Verh. Bat. Gen. XXIII (1849), 1850. Sparid. p. 12 (nec C.V.).

Dentex gracilis Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873. Révision Dentex, p. 34. Atl. Ichth. VIII, 1876—1877, p. 93.

D. X. 9 (10). A. III. 7 (8). P. 2. 14. V. I. 5. Ll. circa 50. Ltr. $\frac{3}{\frac{1}{11}}$.

Height 3.8—3.9, 4.8—4.9 in length with caudal. Head 3.2—3.3, 3.9—4.3 in length with caudal. Height of head, measured in vertical through hindborder of preoperculum, equal to length of head without operculum. Eye 2.9, scarcely more than snout. Interorbital space 1.1—1.5 in eye. Mouth somewhat oblique, maxillary reaching nearly to below frontborder of pupil. Depth of suborbital more than half vertical diameter of eye, less deep in small specimens. Hindborder of suborbital oblique, forming a more or less straight line, which, when produced, reaches the dorsal profile two scales before origin of dorsal. Narrow bands of teeth in anterior part of jaws: an outer row of about 18 enlarged teeth and 3 canines anteriorly in each ramus of the upper jaw. An outer row of about 13 enlarged teeth on each ramus of lower jaw. No canines in the lower jaw. Hindborder of preoperculum with indications of a serrature, its naked limb about half as deep as the scaled part. Dorsal spines rigid and pungent. The membrane between the spines scarcely emarginate. The spines somewhat increasing in length posteriorly, the last as long as postorbital part of head. Soft dorsal slightly higher than spinous part. Anal spines rigid, the third longest. Pectorals slightly longer than ventrals and somewhat shorter than head. Caudal forked. Colour of preserved specimens reddish-brown, with indications of longitudinal bands. Length 178 mm (The type of the species, in rather bad state, seen by us in the Leiden Museum).

Nomen indig.: Passir-passir, Gurusi merah (Malay).

Habitat: Pulu Weh!; Nias; Java (Batavia, Pasuruan, Besuki); Celebes (Makassar); Ambon.

In sea.

5. **Pentapus** Cuvier & Valenciennes

(Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 258).

?*Leiopsis* Bennett, Memoir of the life of Raffles. London. 1830, p. 688 1).

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1) According to Günther (Cat. Brit. Mus. I. 1859, p. 380). The diagnosis of Bennett however is much too short to prove this synonymy. Bennett gives as type of the genus: *Leopsis Rafflesii.* Neither Günther nor any

Heterodon Bleeker, Nat. Geneesk. Arch. Ned. Indië II, 1845, p. 523 (nomen nudum).
Heterognathodon Bleeker, Journ. Ind. Arch. II, No. IX. 1848, p. 636.

Body oblong, slightly compressed, covered with moderate ctenoid scales. Lateral line continuous, following the profile of the back, much nearer to the dorsal profile than to middle of sides, curving down to the middle of the caudal peduncle. Preorbital naked or scaly, scalloped to fit the end of the scaleless maxillary. Postorbital tapering caudad into a more or less blunt point, but without spine. Preoperculum, interoperculum, suboperculum and operculum covered with scales, those of preopercular margin less regularly arranged than the other series on that bone and sometimes wanting. Hind-border of preoperculum serrated or smooth; preopercular edge and lower border smooth. Operculum with a single stiff, pointed spine.

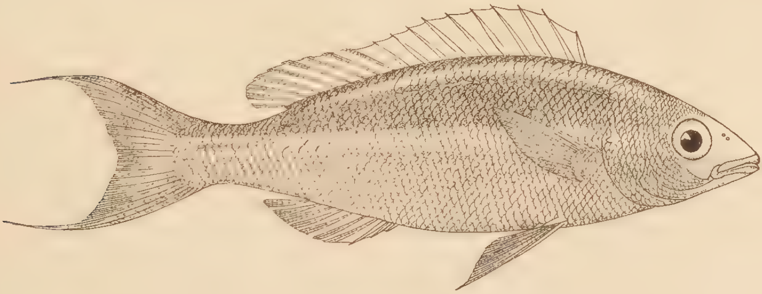

Fig. 75. Pentapus nemurus (Blkr) × ½
N.B. The caudal filaments are generally much longer.

Mouth rather small, horizontal or slightly oblique. Upper jaw slightly protractile. Teeth in the jaws in a narrower or broader villiform band, with an outer series of caninoid ones and with four canines in front of the upper jaw and two distant canines in the lower jaw, which may be wanting. Palate toothless. Six branchiostegals. Gillrakers few and knoblike. Gillmembranes free from isthmus and from each other or connected in their foremost part. One dorsal fin, consisting of X rather slender spines and 9 branched rays. Anal with III spines and 7 soft rays. Caudal forked, one or both lobes sometimes produced into a filament. Pectorals

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later author mention this name. Jordan (The Genera of Fishes Part II, 1919, p. 174) cites *Sparus aurolineatus* Lac. as orthotype of *Leiopsis*, but we do not know for what reason. If Jordan were right, *Leiopsis* had to replace *Gnathodentex*.

moderately pointed. Ventrals with a slender spine and five branched rays, the first of which is the longest and often produced.

Distribution. Coasts of Indic and west Pacific.

Key to the Indo-australian species of Pentapus.

I. Canines in lower jaw strong, almost horizontal, directed outwards and curved backwards. Silvery longitudinal stripes . . . . 1. *P. caninus* p. 382.
II. Canines in lower jaw present, directed upwards.
  A. Hindmargin of preoperculum scaleless, without serrations. Ll. 46. Upper lobe of caudal produced into a filament. Silvery stripes on body, meeting in a darkish spot at base of caudal . . . . 2. *P. setosus* p. 384.
  B. Hindborder of preoperculum scaly and serrated. A broad yellow band from behind eye to caudal.
    a. Both lobes of caudal produced into a long filament. Ll. 50—52, 17—18 scales below it. A second longitudinal band, between dorsal and lateral line . . . . 3. *P. nemurus* p. 386.
    b. Caudal lobes pointed, but not produced into a filament. Ll. 45, 16 scales below it. No second yellow longitudinal band between dorsal and lateral line . . . . 4. *P. macrurus* p. 387.
    c. Caudal lobe not produced into a filament. Ll. 49, 13 scales below it. No second yellow band between dorsal and lateral line. Canines in lower jaw small . . . . 5. *P. hellmuthi* p. 388.
III. Canines in lower jaw wanting. Caudal lobes not produced. A broad yellow band from behind eye to caudal . . . . 6. *P. microdon* p. 389.

1. **Pentapus caninus** (C.V.)

? *Labrus trivittatus* Bloch, Naturgesch. Ausländ. Fische V, 1791, p. 107.
? *Sparus vittatus* Bloch, ibid. Tab. 275.
Scolopsides caninus Cuvier & Valenciennes, Hist. Nat. Poissons V, 1830, p. 354.
Pentapus vittatus Cuvier & Valenciennes, ibid. VI, 1830, p. 260.
Heterodon zonatus Bleeker, Nat. & Geneesk. Arch. Ned. Indië II, 1845, p. 523 (nomen nudum).
Heterognathodon bifaciatus Bleeker, Journ. Ind. Arch. II, 1848, p. 636. — Verh. Bat. Gen. XXIII (1849), 1850, Sciaen. p. 30.
Heterognathodon xanthopleura Bleeker, Nat. Tijdschr. Ned. Indië I, 1850, p. 101. — Verh. Bat. Gen. XXIII (1849), 1850. Sciaen. p. 31.
Scolopsis caninus Günther, Cat. Brit. Mus. I, 1859, p. 364.
Heterognathodon xanthopleura Günther, ibid. p. 305.

Pentapus vittatus Guichenot, Mem. Soc. Sci. nat. Cherbourg. XII (2. Ser. II), 1866, p. 145.

Pentapus xanthopleura Steindachner, Sitzber. Akad. Wien. math. naturw. Cl. IX, II. Abth. 1869, p. 559.

Pentapus caninus Bleeker, Verh. Akad. Amsterdam. XIII (1872), 1873, Révision Dentex, p. 61. — Atl. Ichth. VIII, 1876—1877, p. 103.

Pentapus caninus Macleay, Proc. Lin. Soc. N. S. Wales. VII, 1882, p. 240.

Pentapus vittatus Seale, Occas. Papers B. P. Bishop Mus. IV, 1906, p. 46.

Pentapus vittatus Jordan & Seale, Bull. Bureau Fish. XXVI (1906), 1907, p. 23.

Pentapus caninus Evermann & Seale, ibid. p. 84.

Pentapus caninus Jordan & Richardson, ibid. XXVII, 1908, p. 259.

Scolopsis elongatus M. Weber, Siboga Exp. Fische. 1913, p. 281.

Scolopsis elongatus de Beaufort, Bijdragen Dierkunde. Afl. XIX, 1913, p. 122.

Pentapus caninus Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, p. 38.

Pentapus trivittatus Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 217.

Pentapus caninus Fowler, ibid. p. 218. Bull. U. S. Nat. Mus. Vol. XII, 1933, p. 80 (sine syn.).

D. X. 9. A. III. 7. P. 2. 14. V. I. 5. Ll. 43—46. Ltr. $\begin{array}{c}2\frac{1}{2}\\ \hline 1\\ \hline 14\end{array}$.

Height 2.9—3.2, 3.7—3.9 in length with caudal. Head 3.2, 3.9—4.1 in length with caudal. Eye 3.3—4.4, equal to snout in young specimens, almost twice in snout in large specimens. Interorbital space somewhat convex; less than eye in small specimens, more than eye in large ones. Mouth slightly oblique, maxillary not reaching frontborder of eye. Narrow bands of teeth in both jaws, with an outer series of enlarged ones. Four canines in front of upper jaw. In the lower jaw two distant canines, almost horizontal, directed outwards and curved backwards. Hindmargin of preoperculum serrated, scaly, the lower margin naked. About six curved rows of scales on preoperculum, transverse behind eye, longitudinal below eye, the lower rows of scales below preorbital less regularly arranged than the upper rows. Preorbital naked or with some scales on its upper part, rounded or bluntly pointed behind. Fourth or fourth and fifth dorsal spines longest, equal to or slightly more than postorbital part of head. Origin of anal below second soft ray of dorsal. First anal spine less than half length of second, which is about three fourths of third one. Third spine somewhat less than snout. Pectorals equal to distance between posterior nostril and hindborder of operculum. Ventral spine one third diameter of eye longer than postorbital part of head. First soft ventral ray produced, about half length of snout shorter than head. Caudal forked. Least height of caudal peduncle 1.5 in its length, about equal to snout. Colour of preserved specimens reddish brown above, silvery below. A median silvery stripe from dorsal to between eyes, a somewhat broader one from eye to end of base of dorsal, crossing the lateral line. A third broader stripe from lower part of eye to middle of base of caudal, continued below eye as a very narrow silvery stripe, following the orbital margin. Axil and base of pectorals brownish. Fins yellowish. In older specimens only the third band remains, narrow on the head but very broad on the sides. Length 280 mm.

Nomen indig.: Passir-passir (Malay, Batavia). Andjong-andjong (Malay, Bintang). Mohung (Timor).

Habitat: Singapore; Sumatra (Telok Betong); Bintang; Banka; Biliton; Java (Batavia); Bawean; Celebes (Makassar!, Badjoa, Menado); Talaut Islands!; Sumbawa; Flores!; Timor; Ternate; Halmahera; Batjan; Obi; Ambon; Ceram; Kei Islands!; Waigeu!; Mysore; New Guinea. — Madagascar, Madras, Philippines, Solomon Islands.

In sea.

Note. We are not sure that *Labrus trivittatus* Bloch (l.s.c.), probably a misprint for *Sparus trivittatus,* figured under the name of *Sparus vittatus* on Tab. 275 (not the fish of the same name on Tab. 263), belongs to this species, as Cuvier & Valenciennes thought. Bloch mentions eleven dorsal spines.

A reexamination of the specimens, formerly described by us as *Scolopsis elongatus* has shown us, that they are young ones of *Pentapus caninus.*

2. **Pentapus setosus** C.V.

Pentapus setosus Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 270.
Pentapus setosus Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 175.
Pentapus paradiseus Günther, Cat. Brit. Mus. I, 1859, p. 383.
Pentapus setosus Kner, Novara Exp. Fische, 1865—1867, p. 60.
Pentapus setosus Bleeker, Verh. Akad. Amsterdam. XIII (1872), 1873, Révision Dentex, p. 54. — Atl. Ichth. VIII, 1876—1877, p. 101.
Dentex filifer Castelnau, Res. Fish. Austr. (Vict. Offic. Rec. Philad. Exhib.) 1875, p. 12.
Dentex filifer Macleay, Descr. Cat. Austr. Fish. I, 1881, p. 83.
Pentapus setosus Macleay, ibid. p. 84.
Pentapus paradiseus Macleay, ibid. p. 85.
Pentapus setosus Steindachner, Sitzber. Akad. Wien. math. naturw. Cl. IX, II. Abth. 1869, p. 559.
Pentapus setosus Evermann & Seale, Bull. Bureau Fish. XXVI, 1906, p. 84.
Pentapus setosus Mc Culloch, "Endeavour" Scientif. Res. II, Part 3, 1914, p. 108.

Pentapodus setosus Whitley, Rec. Austral. Mus. XVI, 1928, p. 216.
Pentapodus setosus Fowler, Bull. U. S. Nat. Mus. Vol. XII, 1933, p. 78.

D. X. 9. A. III. 7. P. 2. 15. V. I. 5. Ll. 46. Ltr. $\begin{array}{c}2\frac{1}{2}\\ \hline 1\\ \hline 18\end{array}$.

Height 3.4—3.6, head 3.4—3.5 in length without caudal. Eye 3.5—3.6, somewhat less than snout and than rather convex interorbital space. Mouth somewhat oblique, maxillary reaching nearly to below frontborder of eye. Teeth in upper jaw in a narrow band, the outer series enlarged. Four curved canines in front. In the lower jaw a broad band of small teeth anteriorly, laterally a single series of caninoid teeth, directed backwards. Two small canines in front. Preoperculum without serrations, its corner rounded. Posterior and to a greater part inferior border scaleless, with parallel grooves. Six to seven curved rows of scales on preoperculum, transverse behind and longitudinal below eye; four rows below preorbital. Third, fourth and fifth dorsal spines longest, equal to snout. Origin of anal below third soft ray of dorsal. First anal spine minute, second one more than half as long as third, which is equal to eye. Pectorals equal to head without snout. Origin of ventrals less than one eyediameter nearer to anal than to end of snout. Ventral spine equal to snout and half eye. First soft ventral ray longest, more or less prolonged into a filament, more than head without snout. Caudal forked, the upper lobe produced into a threadlike filament, which may be as long as three fourths of the length of the body. Colour of alcohol specimens reddish brown above, yellowish below. Two silvery stripes from snout to eye. A broader silvery stripe from behind eye, over operculum to base of caudal, where it meets a similar band, running along base of anal, in a darkish spot. A silvery stripe along base of dorsal. These stripes are not always distinct in preserved specimens. Fins yellowish. Length over 200 mm (without caudal filament).

Nomen indig.: Passir (Malay, Batavia). Empasee (Malay, Bintang).

Habitat: Singapore; Sumatra; Bintang; Banka; Biliton; Duizend Islands; Java (Anjer, Batavia!); Celebes (Makassar!, Bonthain); Batjan; Aru Islands! — Madras (according to Kner), coast of Malay! and Tonkin, Philippines, coasts of Queensland, New South Wales and North Western Australia.

In sea.

3. **Pentapus nemurus** (Blkr.) (Fig. 75 p. 381)

Heterognathodon nemurus Bleeker, Nat. Tijdschr. Ned. Indië III, 1852, p. 754.
Heterognathodon nemurus Günther, Cat. Brit. Mus. I, 1859, p. 365.
Pentapus nemurus Bleeker, Verh. Akad. Amsterdam. XIII (1872), 1873. Révision Dentex, p. 58. — Atl. Ichth. VIII, 1876—1877, p. 102.
Pentapus nemurus Seale & Bean, Proc. U. S. Nat. Mus. XXXIII, 1908, p. 244.
Pentapus nemurus Fowler & Bean, ibid. LXII, 1922, p. 39.
Pentapodus nemurus Fowler, Bull. U. S. Nat. Mus. Vol. XII, 1933, p. 74.

D. X. 9. A. III. 7. P. 2. 14. V. I. 5. Ll. 50—52. Ltr. $\dfrac{2\frac{1}{2}}{\dfrac{1}{17-18}}$.

Height 3.2—3.5, head 3.3—3.7 in length without caudal. Eye 3.3—4.5 and 1.1—1.6 in snout, which is about equal to slightly convex interorbital space. Mouth somewhat oblique; maxillary reaching nearly to below frontborder of eye. Teeth in both jaws in a rather broad villiform band, with an outer series of enlarged teeth and four curved canines in the upper jaw, the outer pair stronger than the inner ones. In the lower jaw two strong, distant canines, directed somewhat upwards and outwards. Hindborder of preoperculum slightly serrated. Preopercular limb scaly. About six or seven curved rows of scales on preoperculum, transverse behind, longitudinal below eye and below preorbital, which is scaleless and pointed behind. The lower rows of scales below preorbital less regularly arranged and more deciduous than the upper rows. Fourth or fourth and fifth dorsal spines longest, equal to or somewhat less than postorbital part of head. Origin of anal below interspace between first and second soft dorsal ray. First anal spine half as long as second, which is two thirds of third spine. Third spine equal to eye or to distance between posterior nostril and hinderborder of eye. Pectorals equal to head without snout. Origin of ventrals one and a half to two diameters of eye nearer to anal than to end of snout. Ventral spine equal to snout and half eye, the first soft ventral ray produced into a filament and somewhat less than head. Least height of caudal peduncle twice in its length and somewhat less than postorbital part of head. Caudal deeply forked, the lobes falciform and produced into a filament, which is much longer than the rest of the fin. Colour of alcohol specimens brownish violet above, lighter below. A broad yellow band running from behind eye to base of caudal; a second, narrower one, between dorsal and lateral line, running from head to end of dorsal. Caudal brownish violet, hyaline distally. Other fins light reddish. Length 764 mm.

Habitat. Celebes (Makassar, Tanawanko); Sulu Islands!; Ambon; Timor; Aru Islands!; Waigeu! — Philippines.

In sea.

Note. See note under *L. hellmuthi.*

4. **Pentapus macrurus** (Blkr.)

Heterognathodon macrurus Bleeker, Nat. Tijdschr. Ned. Indië I, 1850, p. 101. Verh. Bat. Gen. XXIII (1849), 1850. Sciaen. p. 31.
Pentapus macrurus Bleeker, Verh. Akad. Amsterdam. XIII (1872), 1873, Révision Dentex, p. 60. — Atl. Ichth. VIII, 1876—1877, p. 103.
Pentapus formosulus Snyder, Proc. U. S. Nat. Mus. XL, 1911, p. 531 (fide Fowler).
Pentapus macrurus M. Weber, Siboga Exp. Fische, 1913, p. 276.
Pentapodus macrurus Fowler, Bull. U. S. Nat. Mus. Vol. XII, 1933, p. 72.

D. X. 9. A. III. 7. P. 2. 14. V. I. 5. Ll. 45. Ltr. $\begin{array}{c}2\frac{1}{2}\\ \hline 1\\ \hline 16\end{array}$.

Height 3, 3.8 in length with caudal. Head 3.6, 4.6 in length with caudal. Eye 3.3, equal to snout and somewhat less than rather convex interorbital space. Mouth somewhat oblique, maxillary not reaching quite to below frontborder of eye. Teeth in bands in both jaws, the outer series enlarged. In the upper jaw four small canines in front. In the lower jaw two short but strong canines, directed outwards and somewhat upwards, placed outside the bands of teeth at some distance of symphysis. Posterior border of preoperculum serrated. About 6 curved rows of scales on preoperculum, transverse behind, longitudinal below eye and below preorbital, which is scaly and bluntly pointed behind. The three lower rows below preorbital less regularly arranged and more deciduous than the upper rows. Preopercular margin scaly. Fourth and fifth dorsal spines longest, equal to snout. Origin of anal below second soft dorsal ray. First anal spine half as long as second, which is about four fifths of third. Third spine slightly more than eye. Pectorals equal to head without snout. Ventral spine about as long as postorbital part of head. First soft ventral ray produced, less than half diameter of eye shorter than head. Least height of caudal peduncle twice in its length, slightly less than postorbital part of head. Caudal deeply forked, the lobes pointed and falciform. Colour of preserved specimens reddish brown, yellowish below. A broad yellow band from behind eye to caudal, narrower and less distinct on head. A pale reddish stripe from base of ventrals along belly to caudal peduncle, running at a short distance above base of anal. Length 240 mm.

Nomen indig: Passir-passir (Malay, Batavia).

Habitat. Java (Batavia); Paternoster Islands!; Rotti!. — Riu Kiu Islands, Philippines.

In sea.

5. **Pentapus hellmuthi** (Blkr.)

Heterognathodon Hellmuthi Bleeker, Nat. Tijdschr. Ned. Indië V, 1853, p. 75.

Pentapus. Hellmuthi Bleeker, Verh. Akad. Amsterdam. XIII (1872), 1873. Révision Dentex, p. 57. — Atl. Ichth. VIII, 1876—1877, p. 102.

D. X. 9. A. III. 7. P. 2. 13. V. I. 5. Ll. 49. Ltr. $\begin{array}{c}2\frac{1}{2}\\ \hline 1\\ \hline 13\end{array}$.

Height equal to head 3.7, 4.5 in length with caudal. Eye 3.4, equal to snout and somewhat less than rather convex interorbital space. Mouth somewhat oblique; maxillary reaching almost vertical through frontborder of eye. Teeth in narrow villiform bands in jaws, the outer series enlarged. Four strong canines in front of the upper jaw, 2 small canines in the lower jaw, the canines of the upper jaw fitting between them, when the mouth is closed. Preoperculum finely serrated along its hindmargin. About 5 curved rows of scales on preoperculum, the upper ones more regularly arranged than the lower ones, about three rows below preorbital, which is scaly and pointed behind. Fourth dorsal spine longest, not much longer than third and fifth and equal to distance between hindborder of pupil and of operculum. First anal spine half length of second, which is as long as snout and three fourths of third spine. Origin of anal below first soft dorsal ray. Pectorals equal to eye and snout, ventral spine as long as postorbital part of head and half eye. Caudal forked, lobes slightly produced (?, broken in the specimen examined). Colour of preserved specimen reddish brown with traces of a rather broad longitudinal band. When fresh a fuscus band from snout to caudal, bordered above and below by yellow or orange, and with a longitudinal series of blue spots below and above lateral line (according to Bleeker). Length 148 mm. Specimens of Bleeker's collection in the Leiden Museum seen by us).

Habitat: Banka; Solor; New Guinea (Manokwari).

In sea.

Note. This species is only known from the few specimens of Bleeker's collection. We examined two specimens from the collection in the Leiden Museum. As the scales on the head and body are partly lost, it is impossible to control the statement of Bleeker, that there are only three or four rows of scales on the preoperculum below preorbital. The canines in the lower jaw are small, but not rudimentary and not smaller than in a specimen of *P. nemurus,* which one of us collected at Saonek (Waigeu). We have therefore hesitated, if lastnamed specimen really belongs to *L. nemurus,* or to *hellmuthi,* also because the specimen, when fresh, showed a yellow band, bordered with brown above and below. It has however a similar band between dorsal and lateral line and the caudal lobes are produced into a filament, although these filaments are not so long as in other specimens of *P. nemurus,* seen by us. We therefore retain it as *P. nemurus.* More and better preserved material is certainly necessary, before the validity of this species can be settled.

6. **Pentapus microdon** (Blkr.)

Heterognathodon microdon Bleeker, Nat. Tijdschr. Ned. Indië IV, 1853, p. 464.

Heterognathodon microdon Günther, Cat. Brit. Mus. I, 1859, p. 366.

Heterognathodon caninus Günther, Fische der Südsee I, 1873—1875, p. 32 (nec C.V.).

Pentapus microdon Bleeker, Verh. Akad. Amsterdam. XIII (1872), 1873. Révision Dentex, p. 36. —. Atl. Ichth. VIII, 1876—1877, p. 101.

D. X. 9. A. III. 7. P. 2. 14. V. I. 5. Ll. 47. Ltr. $\begin{matrix}2\frac{1}{2}\\ \underline{1}\\ 15\end{matrix}$.

Height 3.1, 4.2 in length with caudal. Head 3.5, 4.8 in length with caudal. Eye 3.6, equal to snout and somewhat less than rather convex interorbital space. Mouth somewhat oblique; maxillary reaching nearly to below frontborder of eye. Teeth in bands in both jaws, the outer series enlarged. In the upper jaw 4 moderate canines in front. No canines in lower jaw. Posterior border of preoperculum serrated. Six curved rows of scales on preoperculum, transverse behind eye, longitudinal below eye and below preorbital, which is scaly and pointed behind. The three upper rows of scales below preorbital are more regularly arranged than the lower rows. Fifth dorsal spine longest, equal to distance between hindborder of pupil and of operculum. Origin of anal below second soft dorsal ray. First anal spine half as long as second, which is about four fifths of third. Third spine equal to distance between frontborder of pupil and end of snout. Pectorals slightly more than head without snout. Ventral spine as long as fifth dorsal spine, first soft ventral ray prolonged, about half diameter of eye shorter than head. Least height of caudal peduncle twice in its length, nearly equal to postorbital part of head. Caudal deeply forked, the lobes pointed and falciform. Colour of preserved specimen reddish brown, light below. A broad yellow band from behind eye to caudal, indistinct on caudal peduncle. Fins yellowish. Length more than 200 mm.

Nomen indig.: Pasir-Passir (Malay).

Habitat: Java (Batavia); Lombok!; Ambon. — Okinawa, Louisade Archipelago, Gilbert Islands.

In sea.

6. **Gymnocranius** Klunzinger

(Klunzinger, Verh. zool. bot. Gesellsch. Wien XX, 1870, p. 764. Fische des rothen Meeres I, 1884, p. 36)

Paradentex Bleeker, Arch. Neerl. Sc. Nat. XI, 1876. Syst. Perc. revisum, Pars I, p. 278.

Body oblong, compressed, covered with rather large ctenoid scales. Lateral line continuous, following curve of dorsal profile. Head naked anteriorly, scales beginning behind eyes with a short supra-temporal band of scales, widely separated from that of the other side and, by a narrow scaleless interspace, from the scales behind. Preoperculum with 4—6 transverse rows of scales, its

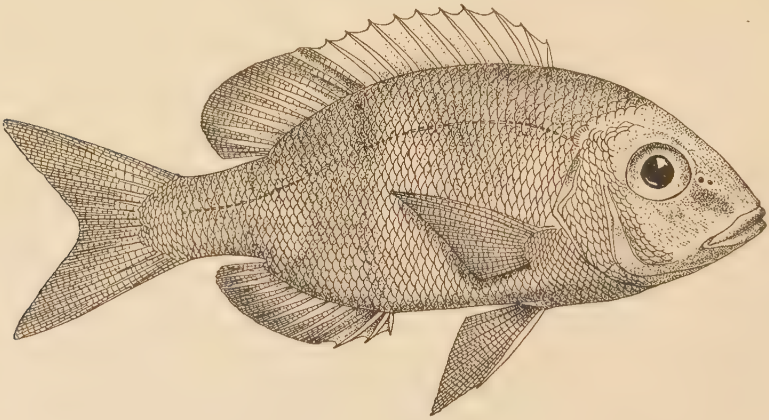

Fig. 76. *Gymnocranius griseus* (Schl.) × 2/5

posterior and inferior limb naked. Operculum, suboperculum and interoperculum scaly. Lips rather thick. Mouth moderate, somewhat protractile. Bands of slender pointed curved teeth anteriorly in the jaws, with a lateral row of conical ones, continued anteriorly as an outer row of the just mentioned band; the teeth here larger and more pointed and curved than laterally, sometimes fang-like. Palate edentulous. Six branchiostegals. Hindborder of preoperculum finely denticulate in young, smooth with age. Operculum with a flat spine. A single dorsal consisting of X spines and 9 to 11 rays. Anal with III spines and 10 or 11 rays. Dorsal and anal without scaly sheath, caudal scaled at base. Pectorals pointed. Ventrals with one spine and five branched rays. Caudal forked. Pseudobranchiae present.

Distribution: Coast of Natal, Madagascar, Mauritius and Réunion, Red Sea, Ceylon, China, Japan, Indo-australian Archipelago, Philippines, Queensland.

In sea.

1. **Gymnocranius griseus** (Schl.) (Fig. 76 p. 390)

Dentex griseus Schlegel, Fauna Japonica, Poissons, 1843, p. 72.
Dentex xanthopterus Bleeker, Nat. & Geneesk. Arch. Ned. Indië II (3), 1845, p. 522 (nomen nudum).
Dentex lethrinoides Bleeker, Verh. Bat. Gen. XXIII (1849), 1850, Spar. p. 11. Nat. Tijdschr. Ned. Indië I, 1850, p. 102.
Lobotes microdon Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 174.
Dentex microdon Bleeker, ibid. p. 219.
Dentex griseus Bleeker, Verh. Bat. Gen. XXVI, 1854—1857, Nieuwe nalez. ichthyol. Japan, p. 88.
Synagris griseus Bleeker, Ned. Tijdschr. Dierk. IV (1871), 1872, p. 138.
Gymnocranius griseus Bleeker, Verh. Akad. Amsterdam XIII (1872), 1873. Révision Dentex, p. 43. Atl. Ichth. VIII, 1876—1877, p. 96.
Gymnocranius lethrinoides Bleeker, ibid. p. 45. Ibid. p. 96.
Gymnocranius frenatus Bleeker, ibid. p. 46. Ibid. p. 97.
Gymnocranius microdon Bleeker, ibid. p. 48. Ibid. p. 98.
Dentex griseus Steindachner & Döderlein, Denkschr. Akad. Wien XLVIII, 1884, p. 16.
Dentex griseus Nyström, Bihang Kon. Svensk. Vet. Akad. Handl. XIII, Afd. IV, No. 4, 1887, p. 12.
Dentex griseus Franz, Abh. Bayer. Akad. Wiss. IV, Suppl. Vol. I, 1910, p. 47.
Gymnocranius griseus Jordan & Thompson, Proc. U. S. Nat. Mus. XLI, 1912, p. 568.
Gymnocranius lethrinoides M. Weber, Siboga Exp. Fische, 1913, p. 284.
Gymnocranius lethrinoides Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, p. 36.
Gymnocranius griseus Fowler, Bull. U. S. Nat. Mus. Vol. XII, 1933, p. 130.

D. X. 10. A. III. 10. P. 2. 12. V. I. 5. Ll. 50. Ltr. $\frac{\frac{5\frac{1}{2}}{1}}{16-17}$.

Height 2—2.3 in young, 2.6—2.8 in length with caudal. In adults 2.4—2.5, 3—3.1 in length with caudal. Head 2.8—3, 3.7—3.9 in length with caudal. Eye 2.8—3.2, slightly less than snout in young, 1.2—1.3 in snout in older specimens. Interorbital space slightly convex anteriorly, more so and even somewhat keeled posteriorly, where it is also narrower and equal to or somewhat more or less than eye. Mouth somewhat oblique. Lips thick, papillose, as well as chin. Maxillary reaching to below nostrils. Bands of pointed slender curved teeth anteriorly in both jaws, with an outer row of caninoid teeth, continued laterally as a single row. In the anterior part of the row these teeth are more or less curved, sometimes very strong and real canines, sometimes less slender and more conical. Those in the sides of the jaw conical and stout. Four or five transverse rows of scales on preoperculum. The depth of the posterior and inferior naked preopercular limb about 1.5 in the scaly part. 13—14 scales between occiput and origin of dorsal. Dorsal spines slender, but pungent, the first more than half length of second, which is shorter than third. Third and fourth spines longest, equal to snout and half eye together, or equal to snout in large specimens. Following spines slightly shorter. Soft dorsal rounded, the median rays longest and longer than longest spines. Anal spines stouter than dorsal ones, the first one more than half length of second, the third longest, longer than eye in small specimens, equal to eye or somewhat shorter in large specimens. Soft anal less rounded and less deep than soft dorsal. Pectorals less than half length of snout shorter than head, in young ones almost as long as head. Ventrals, with the first ray produced, as long as pectorals or slightly shorter. Caudal forked, the lobes pointed. Least height of caudal peduncle 1.3—1.4 in its length. Colour of preserved specimens reddish brown above, with a more or less distinct silvery spot on each scale, silvery below. In young specimens a dark band across interorbital space, connecting eyes, continued through eyes as a transverse band on suborbital and preoperculum. A second dark transverse band before origin of dorsal along hindborder of operculum to base of pectoral. A third band from 5th and 6th dorsal spines, which are also darker, to vent and a fourth from 3rd to 5th soft dorsal rays to anterior part of anal, continued more or less on both fins. A fifth band on caudal peduncle. Intermediate bands may occur, as also a band from eye to anterior part of upper jaw. Traces of these bands may remain in adults, specially the band through eye and the continuation of the third and fourth bands on dorsal and anal, which are more or less clouded. Caudal with some vertical bars in young, not always distinct and disappearing with age. Pectorals yellowish. Ventrals dusky or leaden-coloured. Length 380 mm (Specimens of *G. griseus, lethrinoides* and the types of *G. frenatus* and *microdon* of Bleeker's collection in the Leiden Museum seen by us, as well as typical specimens of *Dentex griseus* Schl. in the same museum).

Habitat: Sumatra (Padang, Siboga); Java (Batavia, Japara); Bali; Flores!; Celebes (Makassar?, Bulukomba!); Sulu Islands!; Aru Islands. — Mauritius and Réunion, China, Japan, Malacca!, Philippines.

In sea.

Note. Jordan & Thompson l.c. have already doubted the distinctness of *G. griseus* and *G. lethrinoides* and one of us (Siboga Exp. l.c.) made the remark, that the species of Bleeker wanted revision. We have now examined the typical specimens of Bleeker and agree with Fowler that *griseus* and *lethrinoides* have to be united. It is true, that the specimens of *G. griseus* have a somewhat larger eye and the caudal deeper forked than those of *lethrinoides,* but the differences are very slight. According to Bleeker, the dorsal spines of *G. griseus* are flexible, those of *lethrinoides* rigid. We find, that the spines are a little stouter in *lethrinoides,* but the same can be said when comparing the two other species, *frenatus* and *microdon,* each known by a single specimen only. Although Bleeker calls the spines flexible in both species, those of *frenatus* are a little stouter and agree with those of *lethrinoides.* We also find the differences in the height of the head other than Bleeker. According to Bleeker the head in *griseus* and *lethrinoides* is higher than that of the two other species, but we find in this respect that *lethrinoides* and *frenatus* agree in having the dorsal profile of the head slightly more elevated and even somewhat keeled. The proportions between the depth of the naked limb and the scaly part of the preoperculum vary slightly in all specimens examined and the same can be said of the development of the teeth, which are not much stronger in *griseus* and *lethrinoides* than in the two other species. At the hand of the further material available, we come to the conclusion, already expressed by Fowler l.c., that *Gymnocranius griseus* is a very variable species, not only in the proportions of height and length of head and body, but also of colouring. The bands, present in young specimens, can leave traces in the adult (*lethrinoides*), or only the band through the eye remains (*microdon*), or they can completely disappear (*griseus* and *frenatus*). Bleeker mentions a light rostro-ocular band in *frenatus*, but in the typical specimen no trace of this band is left.

7. **Symphorus** Günther

(Günther, Ann. Mag. Nat. Hist. (4) IX, 1872, p. 439)

Body oblong, covered with rather large ctenoid scales. Lateral line continuous. Preoperculum with 8—10 transverse rows of scales, its posterior and inferior limb naked. Hindborder of preoperculum denticulate. Mouth moderate. Small teeth in several rows in the jaws, with an outer row of canines in front. Palate edentulous. Seven branchiostegals. A single dorsal consisting of X short and rather feeble spines and 14—16 much longer soft rays, the third to sixth prolonged into long filaments. Anal with III feeble spines, the third much longer than the others. Soft anal rays longer than spines, specially the third, which is produced into a filament. Pectorals rather pointed. Ventrals with a spine and five branched rays. Caudal emarginate. Pseudobranchiae present. Gillrakers few, short, tuberclelike points.

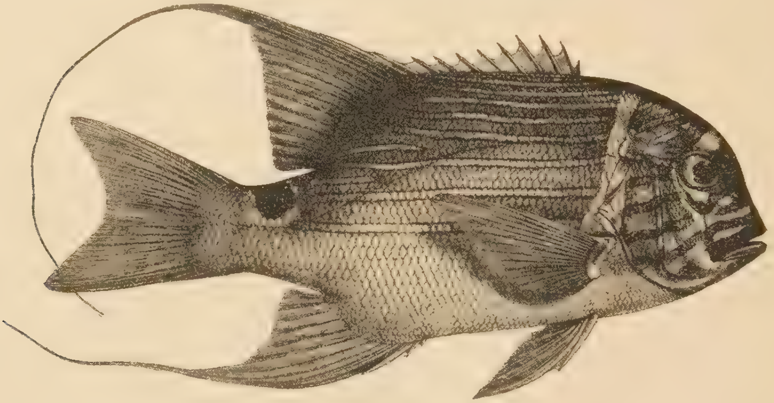

Fig. 77. *Symphorus spilurus* Gthr. After Günther

Distribution: Westpacific.

Key to the Indo-australian species of Symphorus

1. Height 2.2—2.5. A white transverse collar at nape.
Soft vertical fins uniform . . . . 1. *S. spilurus* p. 395.

2. Height 3. No white transverse collar at nape.
Soft vertical fins spotted . . . . 2. *S. taeniolatus* p. 395.

1. **Symphorus spilurus** Gthr. (Fig. 77. p. 394)

Symphorus spilurus Günther, Fische der Südsee I, 1873—1875, p. 61.
Symphorus spilurus Fowler, Proc. Acad. Nat. Sc. Philadelphia 1929 (1930), p. 610. Bull. U. S. Nat. Mus. Vol. XII, 1933, p. 65.

D. X. 14—16. A. III. 8—10. P. ?. V. I .5. Ll. 50—51. Ltr. $\begin{array}{c}10\text{—}12\\ \hline 1\\ \hline 18\text{—}23\end{array}$.

Height 2.2—2.5. Head 2.6—3.2. Eye 4.6—5, 1.9—2 in snout and 1.2—1.7 in convex interorbital space. Maxillary reaching to below anterior fifth or third of eye. Teeth small, short, as row of submolars above and about 3 rows of smaller ones in mandible, also front of each jaw with outer row of short conic canines, slightly more prominent, than other teeth. Fifth dorsal spine 3 to 4 in total head length, 6th ray in adult 1.8, fifth ray in young 2.2 in total head and body length to caudal base. Third anal spine 3.1—4.6 in total head length, fourth ray 1.4—1.5. Caudal emarginate. Back very pale brown, sides and below buff to whitish. About 17 longitudinal gray bands, on back narrow and on sides much wider: also variable in detail, often broken in places. With age 4 on cheek above maxillary. Fins all brown, uniform. A broad buff-white band connects eyes. A white transverse collar at nape. A black saddle, encircled by white, on the back of the caudal peduncle, sometimes wanting. Length 287 mm (after Fowler, not seen by us).

Habitat: Talisse Island; Danawan Island. — China, Philippines, Pelew Islands, Admirality Islands.

In sea.

2. **Symphorus taeniolatus** Gthr.

Symphorus taeniolatus Günther, Ann. Mag. Nat. Hist. (4) IX, 1872, p. 439.
Symphorus forsteri Fowler, Bull. U. S. Nat. Mus. Vol. XII, 1933, p. 68 (nec *Sparus forsteri* Bl. Schn.).

D. X. 16. A. III. 9. P. ?. V. I. 5. Ll. 55. Ltr. $\begin{array}{c}9\\ 1\\ 20\end{array}$.

Height 3, a little more than head. Eye 5, situated immediately below the upper profile of the head, rather nearer to the extremity of the snout than to the end of the operculum. Mouth rather oblique. Jaws nearly equal. Maxillary reaching somewhat beyond the vertical from the front margin of the eye. The width of the interorbital space is not much more than the diameter of the eye. About 10 transverse rows of scales on preoperculum. Dorsal spines rather feeble and short, the third to ninth not much differing in length, about one fourth of the length of the head; the tenth is conspicuously longer, and attached to the first ray. The soft dorsal fin elevated, the third to sixth rays being produced into long filaments. Anal spines feeble, the third nearly thrice as long as the second; anal rays long, especially the third which is produced into a filament. Caudal fin emarginate. Pectorals reaching to the vent, the fifth upper ray being the longest. Ventrals not produced into filaments. Olive, fins with a reddish tinge. Body with seven narrow, slightly oblique and undulating bluish bands, edged with darker; a narrower parallel stripe of the same colour between every pair of the bands. The bands and stripes continued along the sides of the head, but more irregular and broken up in their course. The interradial membrane of the soft vertical fins with round violet spots as large as the pupil of the eye. Length 300 mm (after Günther, not seen by us).

Habitat: Celebes (Makassar).

In sea.

Note. We are not convinced by Fowler, that *Sparus forsteni* Bl. Schn. Syst. Ichth. 1801, p. 282, belongs to this species. The finformulae as well as the description of the colour are not in favour of this view.

3. Subfam. POMADASYNAE

Oblong, compressed, covered with small or moderate ctenoid adherent scales. Lateral line complete, its sensory scales often smaller than the other scales, their tubes simple. Head covered with scales with exception of anterior part of snout, lips and chin. Mouth terminal, not much protractile, small or moderate, more or less oblique, the jaws subequal. Lips thick or somewhat swollen. Maxillary slipping under the rather high preorbital. Gillmembranes free from isthmus. Chin sometimes with a median groove and often with a row of pores. Seven branchiostegals. No subocular shelf. Outer face of palatines with a ridge along their posterior edge. Preoperculum serrate. Operculum with a weak spine. Preorbital not serrate. Suprascapular generally exposed. Teeth in the jaws in several rows, at least anteriorly and generally with an outer row of enlarged ones. Palate edentulous. A single, generally more or less deeply emarginate dorsal with a distinct basal sheath, its spinous portion consisting of IX to XV more or less heteracanth spines. Soft dorsal with 12 to 20 rays. Anal short, with III spines, the first of which is very small, the second generally the longest. Soft anal with 7 to 8 rays. A basal sheath more or less developed. Caudal rounded, truncate or emarginate, with 17 principal rays, 15 of which are divided. Pectorals with two unbranched rays and 14 or 15 branched rays, long and pointed. Ventrals inserted well behind base of pectorals, with a strong spine and five rays.

Distribution: Shore fishes of all tropical and subtropical seas.

Key to the Indo-australian genera of Pomadasynae

1. Scales moderate. In indo-australian species Ll. 44—60, 4—9 scales between Ll. and median dorsal spines. Profile of head straight or convex. A central longitudinal groove behind the chin. Generally two pores on chin . . . . 1. *Pomadasys* p. 397.
2. Scales small. In indo-australian species Ll. 53—100, 10—19 scales between Ll. and median dorsal spines. Profile of head parabolic, strongly declivous before eye. Chin with a row of six pores, immediately behind lower lip. No longitudinal groove . . . . 2. *Plectorhynchus* p. 408.

1. **Pomadasys** Lacépède

(Lacépède, Hist. Nat. Poissons IV, 1803, p. 515)

Pristipomus (Cuvier) Oken, Isis 1817, p. 1182.
Pristipoma Cuvier & Valenciennes, Hist. Nat. Poissons V, 1830, p. 243.

Body oblong, compressed, covered with moderate ctenoid scales. Lateral line continuous, slightly curved in its anterior part. Profile of head straight or convex. Head covered with scales, with exception of anterior part of snout, lips and chin. Scales on head often of unequal size. A central longitudinal groove below the chin, in many species with two pores anteriorly on chin. Lips rather thick. Mouth small or moderate, scarcely protractile. Conical pointed teeth in the jaws in narrow bands anteriorly, with an outer row of generally much enlarged ones. No canines. Palate edentulous. Seven branchiostegals. Preoperculum serrate, its hindborder more or less concave. Operculum with an indistinct spine. One single dorsal, consisting of XI to XV more or less heteracanth spines and 12 to 18 soft rays. Dorsal notched. Anal with III spines, the first of which is very small, the second generally longer and stronger than the third, and 7 or 8 soft rays. Dorsal and anal with a low scaly sheath. Pectorals very long and pointed. Ventrals shorter. Caudal truncate or slightly emarginate. Pseudobranchiae present.

Distribution: All tropical seas.

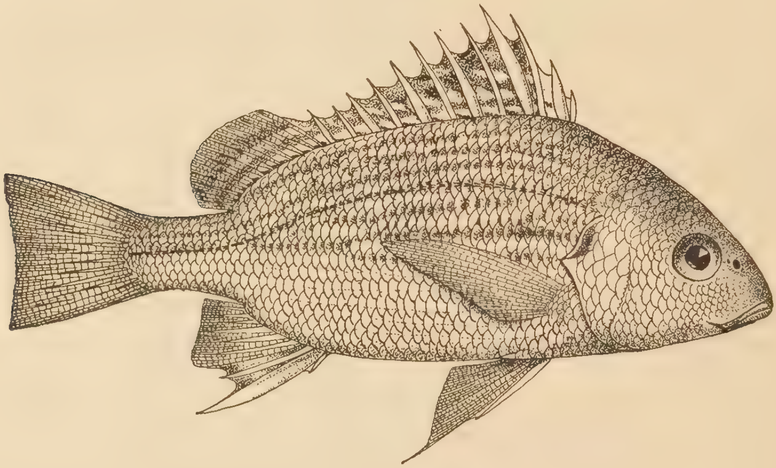

Fig. 78. *Pomadasys hasta* (Bl.) × $^{4}/_{7}$

Key to the Indo-australian species of Pomadasys

A. Operculum not half as long as head, not projecting backwards above the anterior half of the pectoral. A. III. 7—9.
  I. Second anal spine conspicuously longer than third spine.
    a. Ll. 55—60. Nine scales between lateral line and median dorsal spines. Six longitudinal dark bands . . . . 1. *P. furcatus* p. 399.
    b. Ll. 44—53. Four to six scales between lateral line and median dorsal spines.
      1. Dorsal with a black blotch on its spinous part. Back often with large transverse bands . . . . 2. *P. maculatus* p. 400.
      2. Dorsal spotted. Body with longitudinal rows of spots or transverse bands . . . 3. *P. hasta* p. 402.
      3. Dorsal without spots. Body uniform, silvery . . . . 4. *P. argyreus* p. 406.
  II. Second anal spine nearly as long as third. Ll. 55. Nine scales between lateral line and dorsal. Caudal forked. A. III. 12 . . . . . . 5. *P. olivaceus* p. 407.

B. Length of operculum little less than one half of that of the head, the operculum projecting backwards above the anterior half of the pectoral . 6. *P. auritus* p. 408.

1. **Pomadasys furcatus** (Bl. Schn.)

Grammistes furcatus Bloch Schneider, Syst. Ichth. 1801, p. 187.
Pristipoma paikeeli Cuvier & Valenciennes, Hist. Nat. Poissons V, 1830, p. 259.
Pristipoma paikeeli Cantor, Journ. Asiat. Soc. Bengal XVIII, 1850, p. 1056.
Pristipoma paikeeli Bleeker, Verh. Bat. Gen. XXIII (1849), 1850. Sciaen. p. 20.
Pristipoma furcatum Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 304.
Pristipoma furcatum Day, Fishes of India 1875—1888, p. 73.
Pomadasys furcatus Bleeker, Atl. Ichth. VIII, 1876—1877, p. 26.
Pristipoma furcatum Klunziger, Fische des rothen Meeres I, 1884, p. 28.
Pomadasys furcatus Steindachner, Denkschr. Akad. Wien LXXI, 1902, p. 130.
Pomadasys furcatum Barnard, Ann. S. Africa. Mus. XXI, 1925—1927, p. 681.
Pomadasys furcatus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 320.

D. XII—XIII. 15—16. A. III. 8—9. P. 2. 15. V. I. 5. Ll. 55—60.

Ltr. $\frac{9}{\begin{array}{c}1\\15\text{—}16\end{array}}$.

Height 2.3—2.4, 2.8—3 in length with caudal. Head 3.1—3.2, 3.8—4 in length with caudal. Eye 3.4—3.8, 1.1—1.2 in snout and somewhat more or less than rather convex interorbital space. Mouth somewhat oblique; maxillary reaching to below frontborder of pupil. Several rows of small teeth in the jaws with an outer series of enlarged ones, this being the only row in the sides of the lower jaw. Scales on head reaching before eyes to line connecting posterior nostrils, on preoperculum in about 10 transverse rows. Hindborder of preoperculum concave, finely denticulate. Dorsal spines strong, their membrane rather deeply incised. First spine half length of second, which again is half length of third or somewhat longer. Third to fifth spines subequal and longest, slightly more than postorbital part of head. Following spines gradually decreasing in length to the last, which is equal to or slightly shorter than second spine. First dorsal ray about as long as sixth spine, the dorsal fin therefore notched. Second ray slightly longer than first, following rays gradually decreasing in length to the last, which is about as long as the last spine. First anal spine half as long as third and one third of second, which is not only longer but also much stronger than the third and equal to or exceeding snout and eye together. The membrane between the spines strongly incised. First soft anal ray longer than third, but shorter than second anal spine. Soft anal deeper than soft dorsal, its hindborder somewhat concave. Pectorals half diameter of eye longer than head. Ventrals about equal to head without snout. Caudal slightly forked. Colour of preserved specimens light reddish brown, more or less silvery below, with 6 longitudinal dark parallel bands, the three upper ones from nape to base of soft anal, the fourth from upperpart of eye to upper caudal rays, united with that of the other side on caudal peduncle. The fifth from hindborder of eye to middle of base of caudal, the sixth from below eye, through axil of pectoral to lower caudal rays. With exception of the first and last band the bands are more or less double in their anterior part. Spinous dorsal with a black outerborder. Soft dorsal darkish, with a lighter longitudinal median band. Caudal anal and distal part of ventrals dark violet. Pectorals dusky. Length 375 mm.

Habitat: Sumatra (Benkulen); Java (Batavia, Patjitan, Batu Ulo!). — Madagascar, Natal and Zululand coast, Red Sea, South Arabia, coast of British India. Pinang.

In sea.

2. **Pomadasys maculatus** (Bl.)

Anthias maculatus Bloch, Ausländ. Fische VII, 1797, p. 9.
Lutjanus maculatus Lacépède, Hist. Nat. Poissons IV, 1802, p. 239.
Pristipoma caripa Cuvier & Valenciennes, Hist. Nat. Poissons V, 1830, p. 261.
Pristipoma caripa Bleeker, Verh. Bat. Gen. XXIII (1849), 1850. Sciaen. p. 21.
Pristipoma therapon Bleeker, ibid. p. 22.
Pristipoma caripa Cantor, Journ. Asiat. Soc. Bengal XVIII, 1850, p. 1057.
Pristipoma maculatum Günther, Cat. Brit. Mus. I, 1859, p. 293.
Pristipoma maculatum Kner, Novara Exp. Fische I, 1865, p. 52.
Pristipoma maculatum Klunziger, Verh. zool. bot. Gess. Wien XX, 1870, p. 734.
Pristipoma maculatum Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 306.
Pristipoma therapon Bleeker, ibid. p. 312.
Pristipoma maculatum Day, Fishes of India 1875—1888, p. 74.
Pomadasys maculatus Bleeker, Atl. Ichth. VIII, 1876—1877, p. 27.
Pomadasys therapon Bleeker, ibid. p. 29.
Pristipoma aculatum Klunzinger, Fische des rothen Meeres I, 1884, p. 28.
Pomadasis maculatus Jordan & Evermann, Proc. U. S. Nat. Mus. XXV, 1902, p. 349.
Pomadasis maculatus Jordan & Seale, Bull. Bur. Fish. XXVI (1906), 1907, p. 23.
Pomadasis maculatus Jordan & Richardson, ibid. XXVII (1907), 1908, p. 259.

Pomadasis maculatus Jordan & Starks, Ann. Carnegie Mus. XI, 1917, p. 450.

Pomadasis maculatus Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, p. 36.

Pomadasys maculatum Barnard, Ann. S. Afric. Mus. XXI, 1925—1927, p. 679.

Pomadasys maculatus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 309.

D. XII. 14 (15). A. III. 7 (8). P. 2. 14—15. V. I. 5. Ll. 49—53.

Ltr. $\begin{array}{c}5\text{—}6\\ \hline 1\\ \hline 12\text{—}15\end{array}$.

Height 2.7—2.9, 3.2—3.5 in length with caudal. Head 2.8—3.1, 3.4—3.7 in length with caudal. Eye 3.3—3.8, somewhat less than snout in small specimens, 1.2—1.3 in snout in larger ones, and somewhat more than scarcely convex interorbital space. Mouth somewhat oblique, maxillary reaching to below frontborder of eye or not quite so far. Narrow bands of small pointed teeth in the jaws, with an outer series of enlarged ones. Scales on head reaching before eyes to a line connecting posterior nostrils; on preoperculum in about 10 transverse rows. Hindborder of preoperculum concave, rather coarsely denticulate. Dorsal spines slender, their membrane rather deeply incised between each spine. First spine less than half length of second, which is about three fourths of third. Third spine longest, equal to eye and snout together or slightly longer. Following spines gradually decreasing to the eleventh spine, which is shorter or much shorter than the second one. Last spine as long as or slightly longer than penultimate one. First dorsal ray as long as eighth spine, dorsal therefore notched. Following rays shorter. Soft dorsal slightly rounded. First anal spine as long as pupil, second one much stronger and longer than third, equal to snout and half eye together or somewhat longer. First soft anal ray longer than third spine, median soft rays shortest, lower border of the fin therefore with a double concavity. Pectorals as long as head; ventrals, with the first ray produced, slightly more than head without snout. Caudal slightly incised, its hindborder straight when the fin is expanded. Colour of preserved specimens silvery. Membrane of spinous dorsal with a broad black band between the third and seventh spines, often continued forward and backward and sometimes with a second lighter and much narrower band above it. Distal part of soft dorsal and caudal dusky. Other fins yellowish or reddish. Back often with broad brown crossbands: the first on nape, the second below middle of spinous dorsal, the third below beginning and the fourth below end of soft dorsal. The fifth on caudal peduncle. These bands not always present and perhaps sometimes disappearing in preserved specimens. Length 400 mm.

Nomen indig: Krot-krot (Malay).

Habitat: Singapore; Sumatra (Benkulen, Priaman, Siboga, Bagan Si Api Api); Nias; Banka; Java (Batavia!, Bantam, Anjer, Semarang); Bawean; Bali; Lombok!; Borneo (Sandakan); Celebes (Makassar!, Tanette!, Badjoa, Bulukomba, Kema); Ambon; Rotti!, Waigeu; New Guinea. — East coast of Africa from Natal, Red Sea, coast of British India, Ceylon, Andamans, Malacca!, China, Formosa, Philippines, Torres Strait.

In sea.

Note. *P. therapon,* of which we have examined the typical specimens of Bleeker's collection in the Leiden Museum, does not differ from *P. maculatus* excepting the lack of the bands on the body. As remarked under *P. hasta,* the bands on the body vary greatly in this species and the same may be the case in *P. maculatus.* We think it even probable, that one and the same specimen may change its coloration by expansion or retraction of its chromatophores.

3. **Pomadasys hasta** (Bl.)

Lutjanus hasta Bloch, Ausländ. Fische IV, 1790, p. 109.
Lutjanus hasta Bloch Schneider, Syst. Ichthyol. 1801, p. 324.
Labrus Commersoni Lacépède, Hist. Nat. Poissons III, 1802, p. 431, 477.
Lutjanus hasta Lacépède, ibid. IV, 1802, p. 229.
Lutjanus microstoma Lacépède, ibid. p. 181, 216.
Coius gridgutia Hamilton Buchanan, Fishes Ganges, 1822, p. 94.
Pristipoma kakaan Cuvier & Valenciennes, Hist. Nat. Poissons V, 1830, p. 244.
Pristipoma hasta Cuvier & Valenciennes, ibid. p. 247.
Pristipoma chrysobalion Cuvier & Valenciennes, ibid. p. 248.
Pristipoma kakaan Rüppell, Neue Wirbelthiere, Fische, 1837, p. 123.
Pristipoma kaakan Bleeker, Nat. Geneesk. Arch. Ned. Indië II (3), 1845, p. 522.
Pristipoma kakaan Richardson, Rep. Ichth. China. Rep. 15th Meeting Br. Assoc. London, 1846, p. 227.
Pristipoma hasta Bleeker, Verh. Bat. Gen. XXIII (1849), 1850. Sciaen. p. 20.
Pristipoma nageb Bleeker, ibid. p. 21 (nec. Rüpp).
Pristipoma commersoni Cantor, Journ. Asiat. Soc. Bengal XVIII, 1850, p. 1054.
Pristipoma hasta Günther, Cat. Brit. Mus. I, 1859, p. 289.
Pristipoma nageb Günther, ibid. p. 290 (partim).
Polotus nitidus Blyth, Journ. Asiat. Soc. Bengal 1858, p. 282. ibid. 1860, p. 111.

Pristipoma hasta Jouan, Mém. Soc. Sc. Nat. Cherbourg XIII (Ser. 2. III), 1867, p. 256.
Pristipoma hasta Klunziger, Verh. zool. bot. Ges. Wien XX, 1870, p. 733.
Pristipoma manadense Günther, Proc. Zool. Soc. London, 1871, p. 657.
Pristipoma hasta Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 308.
Pristipoma nageb Bleeker, ibid. p. 310.
Pristipoma hasta Day, Fishes of India 1875—1888, p. 73.
Pristipoma argenteum Day, ibid. p. 74 (nec Forsk.).
Pomadasys hasta Bleeker, Atl. Ichth. VIII, 1876—1877, p. 28.
Pomadasys manadensis Bleeker, l.c.
Pomadasys nageb Bleeker, ibid. p. 29 (nec. Rüpp.).
Pristipoma hasta Klunziger, Fische des rothen Meeres I, 1884, p. 28.
Pomadasis hasta Rutter, Proc. Acad. Nat. Sc. Philadelphia, 1897, p. 75.
Pomadasys hasta Steindachner, Denkschr. Akad. Wien LXXI, 1902, p. 131.
Pomadasis hasta Jordan & Evermann, Proc. U. S. Nat. Mus. XXV, 1902, p. 349.
Pomadasys nageb Bean & Weed, Proc. U. S. Nat. Mus. XLII, 1912, p. 29 (nec Rüpp.).
Pristipoma hasta M. Weber, Siboga Exp. Fische, 1913, p. 277.
Pristipoma manadense M. Weber, ibid. p. 278.
Pomadasys hasta Mc Culloch, Checklist of fish etc. New S. Wales, Prt. II, 1919, p. 57.
Pomadasis hasta Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, p. 35.
Pomadasys hasta Barnard, Ann. S. Afr. Mus. XXI, 1925—1927, p. 677.
Pristipoma hasta Vinciguerra, Ann. Mus. Civ. Genova (3) X (L), 1926, p. 574.
Pristipoma argenteus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 311 (nec Rüpp.).
Pristipoma hasta Fowler, ibid. p. 313.

D. XII. 13—15. A. III. 7 (8). P. 2. 14—15. V. I. 5. Ll. 45—52.

Ltr. $\begin{array}{c}4\text{—}5\\ \hline 1\\ \hline 12\text{—}14\end{array}$.

Height 2.5—2.8, 3.1—3.5 in length with caudal. Head 2.5—3, 3.3—3.4 in length with caudal. Eye 3.2—4.3, equal to snout in small specimens, 1.2—1.4 in snout in larger ones and somewhat more than slightly convex interorbital space. Mouth slightly oblique; maxillary reaching to below frontborder of eye or not so far in large specimens. Narrow bands of small pointed teeth in the jaws, with an outer series of enlarged ones. Scales on head beginning before eye in a line connecting posterior nostrils; those on preoperculum of unequal size and in about 10 transverse rows. Hindborder of preoperculum straight or slightly concave, more so in large specimens, rather coarsely denticulate. Dorsal spines rather strong, their membrane deeply incised. First spine half length of second, which is more or less than half length of third. Third and fourth spines longest, equal to head without snout.

Following spines decreasing in length to the eleventh, which is slightly shorter than second spine. Twelfth spine as long as or conspicuously longer than eleventh one. First soft dorsal ray as long as seventh spine, dorsal therefore notched. Soft dorsal slightly rounded. First anal spine about as long as pupil, second much stronger and longer than third, equal to head without snout. First soft anal ray longer than third spine. Soft anal truncate or somewhat rounded. Pectorals scarcely shorter than head, ventrals with the first ray produced, somewhat more than head without snout. Caudal truncate. Colour of preserved specimens silvery, with a reddish-brown hue on the back and the sides. Scales of back and sides each with a brown spot, forming longitudinal rows. Sometimes the spots are indistinct and are replaced by transverse rows of larger spots, which may be confluent into cloudy transverse bands on the back and upper part of sides. Spinous dorsal generally with two or three rows of large blackish spots and often with a narrow black outer margin. Soft dorsal with three rows of small spots, sometimes forming bands or indistinct. Other fins yellowish. Caudal with a dark hue towards the end. Length 440 mm.

Nomen indig.: Krot (Malay), Krokot (Javan.) Towoito and Mengantih (Madura), Garut (Balikpapan).

Habitat: Singapore; Sumatra (Telokbetong, Padang, Siboga); Bintang; Banka; Nias; Java (Batavia!, Anjer, Bantam, Semarang, Tjilatjap, Patjitan, Surabaya!, Banjuwangi, Prigi, Pasuruan, Probolingo, Besuki); Madura; Bali; Borneo (Sampit, Stagen!, Balikpapan!, Sandakan, Sarawak); Celebes (Makassar!, Bonthain, Bulukomba, Badjoa, Menado); Buka Buka Island, Gulf of Tomini; Saleyer!; Sumbawa; Obi-major; Buru; Ceram; Ambon; Waigeu; New Guinea. — East coast of Africa, south as far as Natal coast, Madagascar, Red Sea, coast of British India, China, Formosa, Malacca!, Philippines, Torres Straits, Australia, New Britain.

In sea.

Note. As has already been done previously by one of us, we have followed Klunzinger in uniting *hasta* and *nageb* Blkr, which, according to Klunzinger is not *nageb* Rüpp. Although in a good many specimens we find the combination of a long last dorsal spine, longer than the penultimate one, with an arrangement of the rather large spots on the body in vertical as well as in horizontal rows (*nageb* Blkr.), and others with not much difference in length between the two posterior spines and the spots on the body more numerous and arranged in horizontal rows only (*hasta* Blkr.), we have also seen specimens in which the combination of these two characteristics is reversed. We have had the occasion to examine some living specimens of different size and from different localities (South Africa and the Indo-australian Archipelago) in the aquarium of Amsterdam. All these specimens have the last dorsal spine decidedly longer than the penultimate one. The colour is brownish above, lighter below, with silvery reflections and with darker brown rather hazy transverse bands on the body, somewhat like those of *P. maculatus*. Besides these bands longitudinal rows of spots on the sides of the body are present, varying in distinctness in the different specimens. The spinous dorsal has a blackish outer margin and the soft dorsal has either a faint longitudinal band, or a row of spots, or is almost hyaline. One of the specimens died and is now, after some months of conservation in alcohol, almost uniform silvery, with hardly any traces left of the bands and spots on the body. This shows that great care is necessary when using the coloration of preserved specimens to distinguish the species of this genus. We have also added *Pristipoma manadense* Gthr. to the synonymy of *hasta*. Bleeker l.c. has already remarked, that according to the description of Günther this species is very near to *hasta*, differing in the extraordinary long head and in having but eleven dorsal spines. After informations about the type of the species in the British Museum, kindly given to us by Mr. Norman, who also gave us the opportunity to study another specimen from Celebes, identified by Günther himself, we come to the conclusion that *manadense* is a synonym of *hasta*. Norman writes us, that the type has apparently 12 dorsal spines. The last of these is rather abnormal and was perhaps regarded by Günther as a soft ray and not a spine. With regard to the length of the head in the type, this is slightly more than three in the length of the fish without the caudal fin. Günther's statement is therefore certainly a misprint. The specimen sent to us for examination differs in no way from *hasta*. It has 12 normal spines, the last of which is slightly longer than the eleventh one. One of us (l.c.) brought, although with some hesitation, a specimen to *manadense*, chiefly because the last spine of the dorsal fin was shorter than the penultimate one. Re-examination of this specimen has made us doubt, if this last spine is quite normal. It looks as if it has been broken, its upper end being much less pointed than that of the other spines. In every other respect it agrees with *hasta*.

4. **Pomadasys argyreus** (C.V.)

Pristipoma argyreum Cuvier & Valenciennes, Hist. Nat. Poissons IX, 1833, p. 485.
Pristipoma argyreum ? Bleeker, Verh. Bat. Gen. XXIII (1849), 1850, Sciaen. p. 22.
Pristipoma guoraca Bleeker, ibid. p. 23 (nec C.V.).
Pristipoma guoraca Cantor, Journ. Asiat. Soc. Bengal XVIII, 1850, p. 1055 (nec C.V.).
Pristipoma guoraca Kner, Novara Exp. Fische I, 1865, p. 53 (nec C.V.).
Pristipoma argyreum Day, Proc. Zool. Soc. London 1870, p. 683.
Pristipoma argyreum Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 313.
Pristipoma guoraca Bleeker, ibid. p. 315 (nec C.V.).
Pristipoma guoraca Day, Fishes of India 1875—1888, p. 75 (partim).
Pomadasys argyreus Bleeker, Atl. Ichth. VIII, 1876—1877, p. 30.
Pomadasys guoraca Bleeker, l.c. (nec C.V.).
Pomadasys argyreus Jordan & Richardson, Bull. Bur. Fish. XXVII (1907), 1908, p. 259.
Pristipoma argyreum M. Weber, Siboga Exp. Fische, 1913, p. 277.
Pristipoma argyreum Hase, Jen. Zeitschr. f. Naturw. LI, 1914, p. 528.
Pomadasys guoraka Barnard, Ann. S. Afric. Mus. XXI, 1925—1927, p. 678 (nec C.V.).
Pomadasis grunniens Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 208, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 305 (nec Forster).
Pristipoma guoraca Machan, Ann. Naturh. Museum, Wien XLIV, 1930, p. 434 (nec C.V.).
Pomadasys guoraca Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 306 (nec C.V.).
Pomadasys grunniens Herre, Journ. Pan Pacific Res. Inst. VI, No. 4. 1931, p. 12 (nec Forster).

D. XII. 13—14. A. III. 7 (8). P. 2. 14. V. I. 5. Ll. 44—50. Ltr. $\begin{array}{c} 4\frac{1}{2}\text{—}5 \\ \hline 1 \\ \hline 11\text{—}13 \end{array}$.

Height 2.4—2.7, 2.8—3.2 in length with caudal. Head 2.6—2.8, 3.2—3.3 in length with caudal. Eye 3.2—4.7, 1—1.7 in snout and more than slightly convex interorbital space. Mouth somewhat oblique; maxillary reaching to below frontborder of pupil or not so far. Very narrow bands of small pointed teeth in the jaws, those of the outer row enlarged. Scales on head rather large, beginning before eyes in line connecting posterior nostrils. Scales on preoperculum of unequal size. Hindborder of preoperculum slightly concave, with blunt rather distant serrations. Dorsal spines rather slender. First spine half as long as second, which is more than half length of third. Third spine longest, slightly more than eye and snout together. Following spines gradually decreasing in length, the two posterior ones of equal size. First soft dorsal ray as long as 8th or 9th spine, dorsal therefore moderately notched. Soft dorsal slightly rounded. First anal spine half length of eye. Second spine longer but not always much stronger than third one, equal to postorbital part of head or somewhat longer. First soft anal ray somewhat longer than third spine, equal to diameter of eye. Soft anal truncate. Pectorals as long as head or slightly shorter. Ventrals with the first ray produced, equal to head without snout. Caudal truncate. Colour of preserved specimens silvery with a slight reddish hue on the back. A steel blue blotch on operculum not always distinct. Fins light yellowish. Length 198 mm.

Nomen indig.: Krot-Krot (Malay), Popondak (Sundanese).

Habitat: Singapore!; Sumatra (Benkulen, Padang, Kauer, Priaman, Siboga); Simalur!; Nias; Java (Batavia, Bantam, Kendal!, Anjer); Borneo (Sumpit, Sandakan); Celebes (Badjoa); Buka Buka Islands in Gulf of Tomini; Rotti!; Ambon; New Guinea (mouth of river Tami). — Mauritius, coast of British India, Ceylon, Andamans, Malacca, New Hebrides.

In sea.

Note. We have followed Barnard in uniting Bleeker's *argyreus* and *guoraca*. Although we agree, that specimens of equal size with larger eyes (*argyreus* Blkr.) and with smaller eyes (*guoraca* Blkr.) can be found, there are also intermediate forms with moderate large eyes, amongst them the type of *Pristipoma argyreum*, which we had the opportunity to study in the Paris Museum. We also examined there the type of *P. guoraca* C.V. and found that this is quite a different species from what Bleeker has described under that name. *P. guoraca* is rather like *P. furcatus*, but it has larger scales (Ll. 52 and 8 scales between lateral line and median dorsal spines). The caudal is slightly forked as in *furcatus*.

5. **Pomadasys olivaceus** (Day)

Pristipoma olivaceum Day, Fishes of India 1875—1888, p. 73.
Pomadasys violaceus Steindachner, Denkschr. Akad. Wien LXXI, 1902, p. 131 (fide Fowler).
Pristipoma olivaceum Pellegrin, Bull. Soc. Zool. France XXXIX, 1914, p. 225.
Pomadasys olivaceus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 307.
Pristipoma olivaceus Borodin, Bull. Vanderbilt Marine Mus. Vol. I, Art. 3, 1932, p. 83.

D. XII. 15. A. III. 12. Ll. 55. Ltr. $\frac{9}{15}$.

Height 3—3$^1/_3$, head 3$^3/_4$—4 in total length. Eye 3$^1/_2$—4, equal to snout and 1$^1/_4$ in interorbital space. Fourth dorsal spine the highest. Pectorals nearly as long as head. Second anal spine strongest and nearly as long as the third. Caudal emarginate. Colour olive-grey, the head glossed with purple, a large black blotch bordered in front with yellow at the upper angle of the operculum. Pectorals yellow, as also the basal half of the ventrals, the distal half black with a white edge. Other fins stained with blackish and having fine deep brown dots (After Day, not seen by us).

Habitat: Singapore. — Madagascar, South Arabia, coast of British India, Malay Straits.

In sea.

6. **Pomadasys auritus** (C.V.)

Pristipoma auritum Cuvier & Valenciennes, Hist. Nat. Poissons V, 1830, p. 263.
Pristipoma auritum Cantor, Journ. Asiat. Soc. Bengal XVIII, 1850, p. 1058.
Pristipoma auritum Duncker, Mitth. Naturh. Mus. Hamburg XXI, 1904, p. 149.
Pomadasys auritus Chevey, Inventaire faune ichth. Indochine 19e note, 1932, p. 23.

D. XI—XII. 14. A. III. 7—8.

The length of the opercle little less than one half of that of the head; its posterior angle projects backwards almost above the middle of the pectoral. The fourth dorsal spine longest, and equal to the second of the anal. Spinous dorsal with numerous brownish spots, forming three to six oblique series, the upper margin black. The soft dorsal with some smaller rounded spots. Length 488 mm (the type) and 508 mm (Cantor's specimen) (Compiled, not seen by us).

Habitat: Singapore. — Siam, Annam, Cochinchina, Pinang.

Note. This is a very doubtful species, insufficiently described by Cuvier & Valenciennes and by Cantor after large specimens, possible very old specimens of *P. hasta*.

2. **Plectorhynchus** Lacépède

(Lacépède, Hist. Nat. Poissons III, 1802, p. 134)
Diagramma Cuvier, Mém. Hist. Nat. Paris I, 1815, p. 360.

Body oblong, compressed, covered with small ctenoid scales. Lateral line continuous, gently curved in its anterior part. Profile of head parabolic, strongly declivous before eyes. Head covered with scales, with exception of anterior part of snout, lips and chin. Chin with a row of six pores, immediately behind lower lip. Lips thick. Mouth small, scarcely protractile. Conical pointed teeth in the jaws in several rows anteriorly, in one row posteriorly, the outer row enlarged. No canines. Palate edentulous. Seven branchiostegals. Preoperculum serrate. Operculum with a blunt spine. One single dorsal consisting of IX—XIV heteracanth spines and 15—26 soft rays. The spines decrease gently or abruptly in lenght from the third or fourth, which are generally the longest. In the second case the fin is more or less notched. Origin of dorsal immediately behind head. Anal with III spines and 7—8 (9) soft rays. Origin of anal below second half of soft dorsal. Dorsal, anal and caudal covered with small scales in their basal part. Pectorals and ventrals long and pointed. Ventrals with an axillary process. Caudal generally rounded in the young, truncate or emarginate in old specimens. Small pseudobranchiae present.

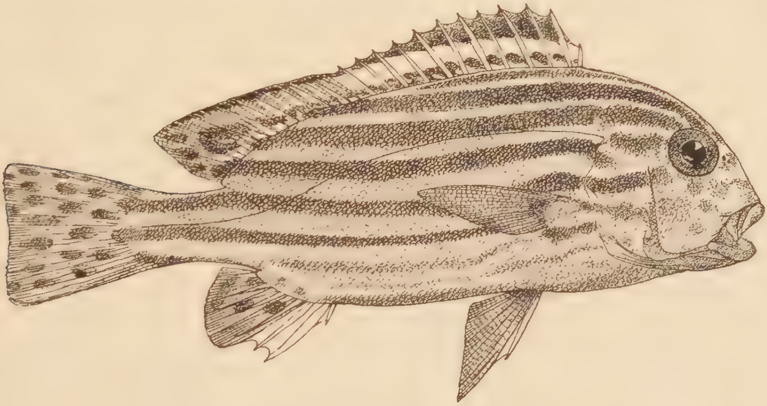

Fig. 79. *Plectorhynchus lineatus* (C.V.) × ½.

Distribution: Indo-pacific, from coast of Natal, Red Sea, Japan and Pacific Islands. Tropical and subtropical Atlantic, one Mediterranean species.

Key to the Indo-australian species of Plectorhynchus

A. D. XIV. 15—16. Height 1.9—2.2. Ll. 51—53 1. *P. crassispina* p. 410.

B. D. XI—XIII. 18—22. Height 2.5—3.

a. D. XI—XII. 18 (19). Ll. 58—65. Body with white patches and irregular dark bands in young; brown spots in adults . . 2. *P. chaetodonoides* p. 413.

b. D. XII. 21—22. Ll. 80—90. Body with light longitudinal bands, bordered by dark-brown above and below. Caudal uniform 3. *P. polytaenia* p. 414.

c. D. XII—XIII. 20—22. Ll. 85—90. Longitudinal light bands, 4 in young, 6 or more in adults. Caudal striped or spotted . . . 4. *P. lineatus* p. 415.

d. D. XII—XIII. 19—20. Ll. 77. Longitudinal bands on body, continued on head, where the superior ones are bent downwards. 9 bands in young, 18 in old ones. Caudal spotted . . . . 5. *P. goldmanni* p. 418.

e. D. XIII. 19—20. 7—8 yellow longitudinal bands on body, continued on head, where the upper ones are more or less bent downwards. Caudal uniform.

a^1. Ll. 65—68 . . . . 6. *P. chrysotaenia* p. 419.

b^1. Ll. 75 . . . . 7. *P. celebicus* p. 420.

f. D. XIII. 18 (19). 3 light bands, the upper and the middle one bent downwards on head. Caudal with irregular bands . . . 8. *P. albovittatus* p. 422.

g. D. XIII. 17. 7—8 bands, the upper ones continued on head, where they remain horizontal. Caudal spotted . . . . 9. *P. cuvieri* p. 423.

h. D. XIII. 18 or XIV. 17. Ll. 80. Dark irregular bands and light patches . . . 10. *P. orientalis* p. 425.

C. D. IX—X. 23—26. Ll. 88—100. Height 2.5—2.7. Striped in young, spotted or uniform in old specimens . . . . 11. *P. pictus* p. 426.

Doubtful species . . . . 12. *P. griseus* p. 429.

1. **Plectorhynchus crassispina** (Rüpp.)

? *Pristipoma nigrum* Cuvier & Valenciennes, Hist. Nat. Poissons V, 1830, p. 258.

? *Pristipoma leucurum* Cuvier & Valenciennes,, ibid. IX, 1833, p. 488.

Diagramma crassispinum Rüppell, Neue Wirbelthiere, Fische 1837, p. 125.

Diagramma crassispinum Bleeker, Verh. Bat. Gen. XXIII (1849), 1850. Sciaen. p. 26.

Pristipoma nigrum Cantor, Journ. Asiat. Soc. Bengal XVIII, 1850, p. 1056.

Diagramma gibbosus Hombron & Jacquinot, Voyage Astrolabe, Zool. III, 1853, p. 46.

Diagramma crassispinum Günther, Cat. Brit. Mus. I, 1859, p. 319.

Diagramma affine Günther, l.c.
Plectorhynchus crassispina Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 232.
Diagramma crassispinum Kner, Sitzber. Akad. Wien LVIII, 1868, p. 300.
Diagramma crassispinum Klunzinger, Verh. zool. bot. Gesellsch. Wien XX, 1870, p. 738.
Diagramma nigrum Day, Proc. Zool. Soc. London 1870, p. 683.
Diagramma crassispinum Day, Fishes of India, 1875—1888, p. 78.
Diagramma gibbosum Günther, Fische der Südsee, I, 1873—1875, p. 26.
Plectorhynchus crassispina Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 277. Atl. Ichth. VIII, 1876—1877, p. 15.
Diagramma crassilabre Alleyne & Macleay, Proc. Linn. Soc. New S. Wales I, 1877, p. 271.
Pseudopristipoma leucurum Sauvage, Bull. Soc. Philom. Paris (7) IV, 1880, p. 220.
Diagramma affine Klunzinger, Sitzber. Akad. Wien, 1880, p. 351.
Diagramma affine Macleay, Descr. Cat. Austr. Fish I, 1881, p. 70.
Pseudopristipoma leucurum Sauvage, Poissons de Madagascar, 1891, p. 161.
Diagramma unicolor Macleay, Proc. Linn. Soc. New S. Wales VIII, 1883, p. 261.
Diagramma crassispinum Klunzinger, Fische des rothen Meeres I, 1884, p. 31.
Plectorhynchus crassispina Steindachner, Denkschr. Akad. Wien LXXI, 1902, p. 132.
Plectorhynchus (Euelatichthys) affinis Fowler, Journ. Acad. Nat. Sci. Philadelphia (2) XII, Prt. 4, 1904, p. 527.
? *Diagramma affine* ? Duncker, Mitth. Naturh. Mus. Hamburg XXI, 1904, p. 149.
Plectorhynchus crassispinus Evermann & Seale, Proc. U. S. Nat. Mus. XXXI, 1906, p. 508.
Euelatichthys crassispinus Jordan & Seale, Bull. Bur. Fish. XXV (1905), 1906, p. 268.
Plectorhinchus crassispinus Fowler & Bean, Proc. U. S. Nat. Mus. LXXI, 1927, p. 7.
Plectorhynchus crassispinus Barnard, Ann. S. Afric. Mus. XXI, 1925—1927, p. 673.
Plectorhinchus nigrus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 233.

D. XIV. 15—16. A. III. 8. P. 2.14—15. V. I. 5. Ll. 51—53. Ltr. $\dfrac{10\text{—}11}{\dfrac{1}{20\text{—}21}}$.

Height 1.9—2.2, 2.3—2.6 in length with caudal. Head 2.8—3, 3.4—3.6 in length with caudal. Eye 3.3—3.9 (4.8 in a specimen of 350 mm.), 1.2—1.3 in snout (1.9 in a specimen of 350 mm.) and somewhat more than interorbital space (eye 1.3 in interorbital space in a specimen of 350 mm.). Mouth somewhat oblique; maxillary reaching to below frontborder of eye. Small teeth in about three rows in the jaws. Preoperculum rectangular, serrate behind. Dorsal notched. First dorsal spine one third of second, which is about half as long as third. Fourth or fourth and fifth spines longest, slightly more than postorbital part of head. Spines rapidly decreasing in length posteriorly. Spines strong and heteracanth, the membrane between them strongly incised. Soft dorsal rounded, its longest rays scarcely less than longest dorsal spines. Soft anal rounded, about as high as soft dorsal. Pectorals as long as head without snout, ventrals somewhat longer, their spine equal to postorbital part of head. Caudal slightly rounded. Colour of preserved specimens lighter or darker reddish brown, in young specimens the distal part

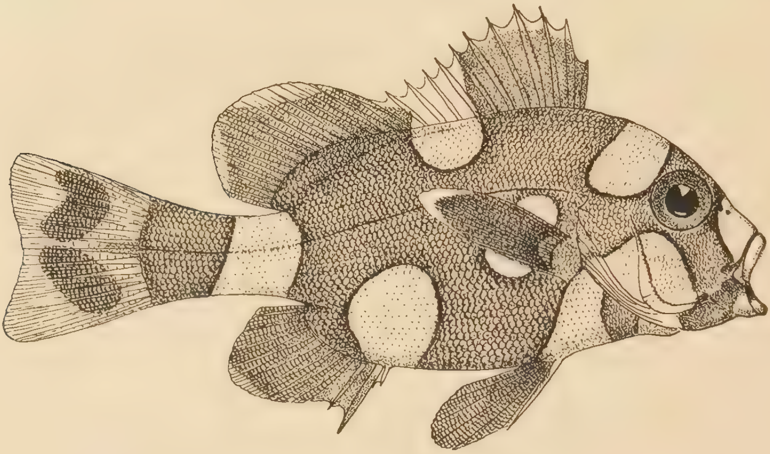

Fig. 80. *Plectorhynchus chaetodonoides* Lac. Young specimen. n.s.

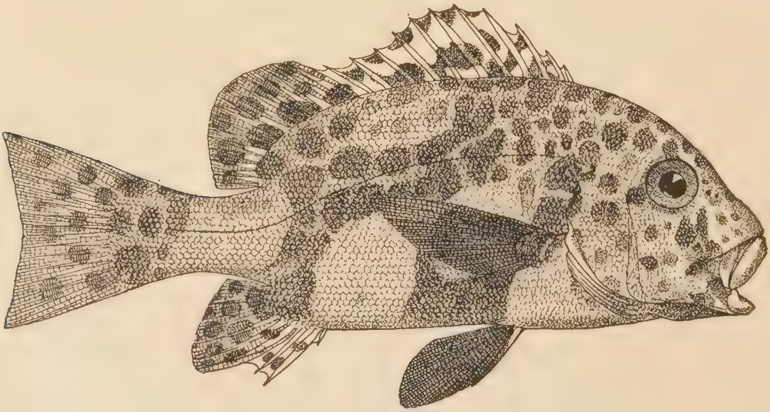

Fig. 81. *Plectorhynchus chaetodonoides* Lac. Semi-adult. × 5/9.

of caudal and of soft dorsal and anal white. Ventrals darker in their distal part. Length 350 mm(Specimens of Bleeker's collection in the Amsterdam Museum seen by us).

Nomen indig.: Biber-tebel (Malay), Pelabatu (Javanese).

Habitat: Singapore!; Pulu Weh!; Simalur!; Batu Islands; Sumatra (Trussan, Benkulen, Padang, Ulakan, Siboga, Singkel, Tapatuan!); Banka; Borneo (Pontianak, Sampit, Sandakan); Java (Batavia!, Semarang, mouth of river Opak!); Kangean Islands!; Lombok!; Celebes (Makassar!, Bothain, Bulukomba, Menado); Saleyer!; Flores!; Ternate; Makian; Obi-major; Ambon; Goram; Buru; Ceram; Misol; Waigeu; New Guinea. — From eastcoast of Africa, south to Natal, Madagascar, Red Sea, coast of Arabia, British India, Malacca, China, Philippines, Queensland, New Ireland, Polynesia. In sea and estuaries.

2. **Plectorhynchus chaetodonoides** Lac.

(Fig. 80, p. 412; Fig. 81, p. 412)

Plectorhynchus chaetodonoides Lacépède, Hist. Nat. Poissons III, 1800, p. 135.

Lutjanus chaetodonoides Lacépède, ibid. IV, 1802, p. 195, p. 243.

Chaetodon plectorhynchus Shaw, Zool. IV, 1803, p. 356.

Diagramma plectorhynchus Cuvier & Valenciennes, Hist. Nat. Poissons V, 1830, p. 294.

Diagramma pardalis Cuvier & Valenciennes, ibid. p. 300.

Diagramma plectorhynchos Bleeker, Verh. Bat. Gen. XXIII (1849), 1850. Sciaen. p. 24.

Diagramma pardale Günther, Cat. Brit. Mus. I, 1859, p. 323.

Diagramma chaetodontoides Bleeker, Acta Soc. Sci. Indo-Neerl. VI. 1859, Enum. Pisc. p. 30.

Plectorhynchus chaetodonoides Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 232. Ibid. IV (1872), 1873, p. 282. Atl. Ichth. VIII, 1876—1877, p. 17.

Diagramma Papuense Macleay, Proc. Linn. Soc. New S. Wales VII, 1882, p. 237.

Plectorhynchus chaetodonoides Jordan & Seale, Bull. Bur. Fish. XXV (1905), 1906, p. 267.

Plectorhynchus papuensis Jordan & Seale, ibid. p. 268.

Plectorhynchus chaetodonoides Snyder, Proc. U. S. Nat. Mus. XLII, 1912, p. 500.

Plectorhinchus chaetodontoides Fowler & Bean, ibid. LXII, 1922, p. 34.

Plectorhinchus chaetodonoides Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 257.

D. XI—XII. 18 (19). A. III. 8 (9). P. 2.15. V. I. 5. Ll. 58—65.

$$\text{Ltr. } \frac{11\text{—}12}{\frac{1}{18\text{—}24}}.$$

Upper profile rounded, strongly declivous before eye. Height

2.5, 2.8—3 in length with caudal. Head 3—3.1, 3.4—3.7 in lenght with caudal. Eye 3.8—5, 1.4—1.7 in snout and about equal to convex interorbital space. Mouth slightly oblique; maxillary reaching to below frontborder of eye. About three rows of small teeth in the jaws, with an outer row of larger pointed ones. Preoperculum rectangular, rounded at corner, denticulate behind. Dorsal deeply notched between spinous and soft part. First dorsal spine half length of second, which is three fourths of third. Third spine longest, almost equal to head without snout. Spines after third gradually decreasing in length. Soft dorsal more or less pointed, the middle rays longest and as long as third dorsal spine. First anal spine minute, second one somewhat longer and stronger than third, about one third of eye longer than postorbital part of head. Anal truncate, longest rays about as long as longest rays of soft dorsal. Pectorals and ventrals subequal, half length of snout shorter than head. Caudal rounded in young, emarginate in adult specimens, the lobes rounded. Colour of young can either be described as light brown, with large irregular white patches, encircled by dark brown, or as white with irregular brown bands, the first through eye, connected posteriorly through a broad band of the same colour with those of the body, the last of which runs between base of soft dorsal and anal. The last band on caudal peduncle near base of caudal. The interspaces between the bands with larger and smaller spots. In a following stage the bands are broken into large brown spots. In still older specimens the head and body are covered with brown spots. Vertical fins and pectorals with similar brown spots. Ventrals dark brown. Length 450 mm (Specimens of Bleeker's collection in the Leiden and Amsterdam Museum seen by us).

Nomen indig.: Gadji (Malay).

Habitat: Singapore!; Pulu Weh!; Java (Batavia!); Celebes (Menado); Ternate; Ambon!; Haruko. — Okinawa, Philippines, Fiji islands, Samoa.

In sea.

3. **Plectorhynchus polytaenia** (Blkr.)

Diagramma polytaenia Bleeker, Nat. Tijdschr. Ned. Indië III, 1852, p. 755.
Diagramma polytaenioïdes Bleeker, ibid. VI, 1854, p. 377.
Diagramma polytaenia Günther, Cat. Brit. Mus. I, 1859, p. 332.
Diagramma polytaenioides Günther, ibid. p. 333.
Plectorhynchus polytaenia Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 232.
Plectorhynchus polytaenioides Bleeker, ibid. II, 1865, p. 282.
Plectorhynchus polytaenia Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 296. Atl. Ichth. VIII, 1876—1877, p. 23.

Diagramma polytaenia Macleay, Descr. Cat. Austr. Fish I, 1881, p. 71.
Plectorhynchus palytaenia Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, p. 33 (misprint).
Plectorhinchus polytaenia Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 240.

D. XII. 21—22. A. III. 7—8. P. 2.15. V. I. 5. Ll. 80—90. Ltr. $\begin{array}{c}13\\ \hline 1\\ \hline 24\end{array}$.

Height 2.6—2.9, 3.1—3.6 in length with caudal. Head 3.2—3.3, 4 in length with caudal. Eye 3.4—4, 1.2—1.6 in snout and somewhat more or less than convex interorbital space. Mouth horizontal; maxillary reaching to below frontborder of eye. Preoperculum rectangular, rounded at corner, denticulate behind. About 6 rows of teeth in the jaws, the outer ones enlarged. Dorsal somewhat notched. Dorsal spines strong, heteracanth. First spine equal to or longer than second. Third and fourth spines longest, as long as postorbital part of head. Last spine equal to or slightly shorter than second spine. Soft dorsal rounded, the longest rays about equal to longest spines. First anal spine minute, second one stronger and slightly longer than third, somewhat more or less than postorbital part of head. Soft anal rounded, of same depth as soft dorsal. Pectorals and ventrals subequal, half length of snout shorter than head. Caudal truncate in old specimens, rounded in young ones. Colour of preserved specimens brown with margaritaceous longitudinal bands, bordered by dark brown above and below. Two bands above eye, meeting irregularly on head, the second one reaching on body to end of dorsal. Third and fourth bands from eye, joining on the body in its anterior part or more posteriorly, running to middle of caudal rays. Fourth band from maxillary, through axil of pectoral, to lower caudal rays. In old specimens the number of bands increases. Soft dorsal and pectorals with darker stripes or bands, disappearing with age. Length 420 mm (Specimens of Bleeker's collection in the Leiden Museum seen by us).

Habitat: Lombok!; Celebes (Makassar); Solor; Ternate; Batjan; Ambon; Misol; New Guinea. — Philippines, N. Australia. In sea.

4. **Plectorhynchus lineatus** (C.V.) (Fig. 79, p. 409)

? *Perca diagramma* Linné, Systema Naturae, edit. X, 1758, p. 293.
? *Perca lineata* Linné, l.c.
? *Grammistes lineatus* Bloch Schneider, Syst. Ichthyol, 1801, p. 186.

Diagramma lineatum Cuvier & Valenciennes, Hist. Nat. Poissons V, 1830, p. 309.
Diagramma Lessoni Cuvier & Valenciennes, ibid. p. 313.
Diagramma Lessoni Lesson, Voyage Coquille, Zool. II, 1830, p. 199.
Diagramma lineatum Bleeker, Nat. Tijdschr. Ned. Indië IV, 1853, p. 112.
Diagramma Lessonii Bleeker, ibid. p. 463.
Diagramma radja Bleeker, ibid. V. 1853, p. 336.
Plectorhynchus radja Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 232.
Plectorhynchus lineatus Bleeker, l.c.
Diagramma lessoni Playfair, Fishes of Zanzibar, 1866, p. 28.
Diagramma lineatum Day, Fishes of India, 1875—1888, p. 75 (partim).
Plectorhynchus lineatus Bleeker, Ned. Tijdschr. Dierk. IV, 1873, p. 286. Atl. Ichth. VIII, 1876—1877, p. 19.
Plectorhynchus Lessoni Bleeker, ibid. p. 288. Ibid. l.c.
Plectorhynchus radja Bleeker, ibid. p. 289. Ibid. p. 20.
Diagramma lineatum M. Weber, Siboga Exp. Fische 1913, p. 278.
Plectorhynchus lineatus Barnard, Ann. S. Afric. Mus. XXI, 1925—1927, p. 671 (partim).
Plectorhinchus diagramma Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 206. Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 244 (partim).
Plectorhinus lineatus Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 252 (misprint).
? *Plectorhynchus diagramma* Chevey, Inventaire faune ichth. Indochine, 19e note, 1932, p. 22.

D. XII. 20—XIII. 22. A. III. 7 (8). P. 2. 14—15. V. I. 5. Ll. 85—90. Ltr. $\begin{array}{c}13\text{—}14\\ \hline 1\\ \hline 24\text{—}25\end{array}$.

Dorsal profile gently rounded, descending abruptly above eye, the head being very blunt. Height 2.7—2.8, 3.3—3.5 in lenght with caudal. Head 3.1—3.3, 4—4.2 in length with caudal. Eye 3.2—4, 1.3—1.5 in snout. Mouth slightly oblique. Lips thick. Maxillary reaching to below frontborder of eye. Three rows of teeth in the jaws, the outer row consisting of larger pointed teeth. Preoperculum rectangular, serrate behind. Dorsal scarcely notched. First dorsal spine half length of second, which is shorter than third. Fourth to sixth of equal length, as long as postorbital part of head. Following spines slightly decreasing in length posteriorly, the last spine as long as or slightly shorter than the second spine. Soft dorsal acutely rounded, higher than spinous part. First anal spine minute, second somewhat longer than third and equal to postorbital part of head and half eye together. Soft anal acutely rounded, as deep as soft dorsal. Pectorals half length of snout shorter than head, ventrals somewhat longer, their spine slightly more than postorbital part of head. Caudal somewhat rounded in young, truncate or emarginate in old specimens. Colour of preserved specimens: In the young ones brown, belly lighter, with four longitudinal narrow white bands; the first beginning in the median line on nape, through basal part of spinous dorsal, ascending on soft dorsal. The second from snout, above eye to end of caudal, running through the upper part of that fin; the third from below eye, through axil of pectoral to end of caudal, running through the lower part of that fin; the fourth below pectoral to anal. Pectorals black, bordered above and below by white. In older specimens new bands arise, one between the first and second, beginning in the median line on snout splitting before the origin of the first, sometimes united with it, running below spinous dorsal, ascending on soft dorsal below the first. Another band between the second and the third, from snout through eye to middle of median caudal rays. In this stage the second and third band converge on the caudal towards the median line, almost touching each other at the end of the median caudal rays. Between the just described median band on the caudal, and each of these bands an oblique band, the upper one parallel to the upper, the lower one parallel to the lower band, both therefore convergent. The median band on the body may split again in its anterior part and the bands may be connected in different ways on the head. Spinous dorsal with a dark brown base and a dark brown margin leaving a broad white band between them, which is the posterior part of the first band of the young. Anal longitudinally striped dark brown and white. The light borders of the pectorals form two bands, converging posteriorly, in the adults, and parallel to them new bands arise, connected through a transverse white band not far from base of fin. With age the white on the pectorals increases, leaving some dark spots only and disappearing in old specimens (*radja*). In very large specimens the dark interspaces between the bands on the dorsal, anal and caudal are dissolved into rows of spots (*lessoni*). Length 360 mm (Typical specimens of *P. radja* and specimens of *P. lessoni* of Bleeker's collection in the Leiden Museum seen by us).

Nomen indig.: Radja bau (Malay Moluccos).

Habitat: Java (Batavia); Lombok!; Celebes (Badjoa, Menado, Tanawanko); Siau!; Sangir Islands; Halmahera; Ternate; Obi-major!; Buru; Ambon!; Saparua; Haruko; Goram; Banda; Flores!; Rotti!; Timor; Waigeu; New Guinea. — Mozambique, Zanzibar, Red Sea, Aden, coast of British India, Ceylon, Philippines.

In sea.

Note: If the finformulae given by Linné for *Perca diagramma* and *Perca lineata* are to be trusted, these species cannot be identical with *P. lineatus* as described above.

After having compared specimens of Bleeker's collection of *P. lineatus, radja* and *lessoni* we are convinced that they belong to one and the same species. Bleeker has already shown, that the specimens described by Günther as *Diagramma lessoni* are not that species but that they are identical with *Bodian cuvieri* Bennett, a species easily distinguished from *lessoni* by the horizontal course of the bands on the head. Several later authors however have not recognized *P. cuvieri* as a separate species. We cannot agree with this view and we follow Bleeker in keeping it apart.

5. **Plectorhynchus goldmanni** (Blkr.)

Diagramma Goldmanni Bleeker, Nat. Tijdschr. Ned. Indië IV, 1853, p. 602.
Diagramma haematochir Bleeker, ibid. VI, 1854, p. 175.
Plectorhynchus haematochir Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 232.
Plectorhynchus Goldmanni Bleeker, ibid. IV (1872), 1873, p. 292. Atl. Ichth. VIII, 1876—1877, p. 21.
? *Diagramma multivittata* Macleay, Proc. Linn. Soc. New S. Wales II, 1878, p. 349.
Plectorhynchus haematochir Seale & Bean, Proc. U. S. Nat. Mus. XXXIII, 1908, p. 244.
? *Plectorhynchus multivittatus* Ogilby, Mem. Queensl. Mus. III, 1915, p. 120.
Plectorhynchus goldmanni Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 249.

D. XII—XIII. 19—20. A. III. 7. P. 2.15. V. I. 5. Ll. 77. Ltr. $\begin{array}{c}13\\\hline 1\\\hline 26\end{array}$.

Height 2.6, 3.2 in length with caudal. Head 3.2, 3.9 in length with caudal. Eye 4.2, 1.8 in snout and 1.3 in convex interorbital space. Mouth horizontal; maxillary not reaching below frontborder of eye. Preoperculum rectangular, rounded at corner, denticulate behind. About four rows of teeth in the jaws, with an outer row of larger ones. Dorsal spines strong, heteracanth, the first not much shorter than half length of second. Third and fourth subequal, somewhat less than postorbital part of head. Spines gently decreasing in length posteriorly, the last spine about as long as the first soft ray. Following soft rays increasing again in length, the longest equal to postorbital part of head. The posterior rays decreasing rather abruptly in length, the fin rounded behind. First anal spine one fourth of second, which is stronger and slightly longer than third and equal to postorbital part of head. Soft anal rounded, as deep as soft dorsal. Pectorals slightly longer than ventrals and about half length of snout shorter than head. Caudal slightly emarginate. Least height of caudal peduncle four fifths of its length. Colour of preserved specimens yellowish, in young and half grown with about nine broad horizontal dark brown bands, the upper ones bent downwards on head and joining those of the opposite side. In older specimens the bands are narrower and increase in number, up to 18 in large specimens. They are no more horizontal, but ascend obliquely on the body; the lower ones more or less dissolved into spots. Spinous dorsal with large spots between the spines, in old specimens the whole of the finmembrane between the 8 anterior spines totally darkbrown. Caudal and soft dorsal and anal with spots, more or less arranged in rows. Pectorals and ventrals yellowish. Length 515 mm.

Nomen indig: Radja-bau (Ternate).

Habitat: Celebes (Makassar!, Menado); Sula Islands!; Ternate; Halmahera; Gemomo Island; Obi-major; Rotti!; Tanakeke Island; Tomahu Island; Timor; New Guinea. — Philippines.

6. **Plectorhynchus chrysotaenia** (Blkr.)

Diagramma chrysotaenia Bleeker, Nat. Tijdschr. Ned. Indië IX, 1855, p. 203.

Plectorhynchus chrysotaenia Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 249. Atl. Ichth. VIII, 1876—1877, p. 16.

Plectorhinchus faetela Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 237 (partim).

D. XIII. 19—20. A. III. 7—8. P. 2. 14. V. I. 5. Ll. 65—68. Ltr. $\begin{array}{c}12\text{—}13\\ \hline 1\\ \hline 23\end{array}$.

Height 2.7—2.8, 3.5 in length with caudal. Head 3.2—3.3, 4—4.4 in length with caudal. Eye 2.8—2.9, slightly less than snout and distinctly less than scarcely convex interorbital space. Maxillary reaching to below frontborder of eye. Teeth in a few rows in jaws, the outer series enlarged. Preoperculum rectangular, rounded at angle, denticulate behind. Dorsal scarcely notched. First dorsal spine about half length of second, third longest, equal to postorbital part of head. Following spines very slightly decreasing in length, the last one longer than second spine. Soft dorsal rounded, the longest rays somewhat longer than the spines. First anal spine minute, second one much stronger and somewhat longer than third, equal to postorbital part of head and half eye together. End of anal below

11th or 12th dorsal ray. Pectorals and ventrals subequal or pectorals somewhat longer, as long as head without snout. Caudal slightly rounded. Caudal peduncle about as long as high. Colour of preserved specimens brownish, with indications of lighter bands. When fresh bluish above, margaritaceous below; body with 8 rather narrow yellow bands, the two upper ones from head to soft dorsal. Third from upper border of eye to upper caudal rays, fourth and fifth from eye to caudal, sixth from snout below eye to caudal, the seventh and eighth from maxilla to anal. Fins yellow, excepting the dorsal, which is light bluish, with two or three longitudinal yellow bands. Length 109 mm (Description made after two typical specimens of Bleeker's collection in the Leiden Museum).

Habitat: Singapore!; Celebes (Makassar!, Badjoa, Menado). — Philippines.

Note: Sauvage (Poissons de Madagascar, 1891, p. 513) mentions this species in a list of fishes known from Madagascar. As no reference is given, we ignore on whose authority this record is based. As it has never been found west of the Indo-australian Archipelago, we suppose that Sauvage made a mistake.

It is not impossible that this species is only the young stage of *P. celebicus*. On account of the difference we find in the number of scales in the lateral line in the few specimens we could examine, we keep them provisionally apart.

7. **Plectorhynchus celebicus** Blkr.

Plectorhynchus celebicus Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 285. Atl. Ichth. VIII, 1876—1877, p. 18.

Plectorhynchus celebicus Evermann & Seale, Bull. Bur. Fish. XXVI, 1906, p. 84.

Diagramma celebicus M. Weber, Siboga Exp. Fische 1913, p. 279.

Plectorhinchus faetela Fowler, Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 237 (partim).

D. XIII. 19. A. III. 7 (8). P. 2. 15. V. I. 5. Ll. 75. Ltr. $\begin{array}{c}12\text{—}13\\ \hline 1\\ \hline 20\end{array}$.

Dorsal profile curved, more strongly rounded on head. Height 2.6, 3.2 in length with caudal. Head 3.4, 4.3 in length with caudal. Eye 3.6, 1.6 in snout and somewhat more than rather convex interorbital space. Mouth scarcely oblique; maxillary reaching to below posterior nostril. About four or five rows of small teeth in the jaws, with an outer series of larger pointed ones. Preoperculum rectangular, rounded at angle, serrate behind. Dorsal without notch between spinous and soft part. First dorsal spine less than half length of second, which is somewhat shorter than third. Third spine somewhat shorter than fourth, which is longest and somewhat more than postorbital part of head. Behind the fourth the spines decrease gently in length to the last, which again is not much longer than the first soft ray. Soft dorsal rounded behind. First anal spine minute, second and third subequal, but the second the stronger, equal to postorbital part of head. Anal truncate with rounded edges, the longest rays longer than the spines. Ventrals scarcely longer than pectorals and equal to head without snout. Ventral spine equal to postorbital part of head. Caudal emarginate, the lobes pointed.

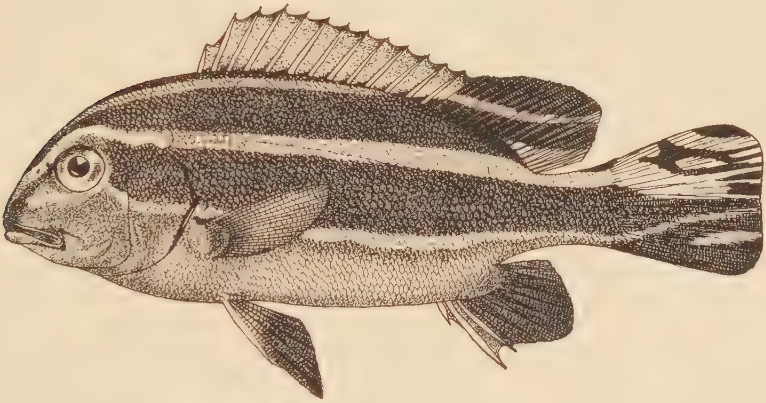

Fig. 82. *Plectorhynchus albovittatus* (Rüpp.) × 5/8.

Caudal peduncle somewhat longer than deep. Colour of preserved specimens reddish brown, with seven yellowish longitudinal bands, narrower than the interspaces. Three beginning above eye and running above lateral line; the fourth and fifth beginning at hinder-border of eye and running to base of caudal. The sixth and seventh begin below eye and, running the one above and the other below base of pectoral, attain respectively the inferior part of base of caudal and the end of base of anal. A short band, between fourth and fifth and a less distinct one between second and third, only developed on postorbital part of head. Fins yellowish. Length 505 mm.

Habitat: Borneo (Sandakan); Celebes (Makassar); Rotti!; Sadaa Island; New Guinea. — Philippines, Solomon Islands.

In sea.

Note. As said above, *P. celebicus* and *chrysotaenia* may only represent the old and the young stage of one species, which, in that case, has to be called *chrysotaenia*.

Fowler l.c. has united the two species with *P. faetela* (Forsk.) (= *Sciaena faetela,* Forskål, Descr. Animalium 1775, p. 51). Forskål's description however is much to incomplete to justify this synonymy, which is the more doubtful, as neither *celebicus* nor *chrysotaenia* have been found in the Red Sea.

8. **Plectorhynchus albovittatus** (Rüpp.). (Fig. 82, p. 421)

Diagramma albovittatum Rüppell, Neue Wirbelthiere, Fische 1837, p. 125.
Diagramma blochii Peters, Monatsber. Akad. Berlin 1855, p. 435 (nec. C.V.).
Diagramma albovittatum Bleeker, Act. Soc. Sc. Indo-Neerl. I, 1856, Beschr. visch. Menado, p. 46.
Diagramma albovittatum Klunzinger, Verh. zool. bot. Gesellsch. Wien XX, 1870, p. 736.
Diagramma lineatum var. *albovittatum* Day, Fishes of India, 1875—1888, p. 79.
Plectorhynchus albovittatus Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 280. Atl. Ichth. VIII, 1876—1877, p. 16.
Diagramma albovittatum Klunzinger, Fische des rothen Meeres I, 1884, p. 31.
Plectorhinchus lineatus Jordan & Richardson, Bull. Bur. Fish. XXVII (1907), 1908, p. 259 (nec C.V.).
Plectorhinchus albovittatus Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 205. Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 242.

D. XIII. 18 (19). A. III. 7 (8). P. 2 .14. V. I. 5. Ll. 73. Ltr. $\begin{array}{c}12\frac{1}{2}\\ \hline 1\\ \hline 22\end{array}$.

Height 2.5, 3.3 in length with caudal. Head 3.1, 4 in length with caudal. Eye 3.6, 1.2 in snout and equal to convex interorbital space. Mouth somewhat oblique; maxillary reaching to below frontborder of pupil. Narrow bands of small pointed teeth in the jaws, preoperculum rectangular, serrate behind. Dorsal slightly notched. Dorsal spines moderately strong, heteracanth, membrane between them slightly incised. First spine more than half length of second, which is about four fifths of third. Third and fourth spines subequal, about as long as postorbital part of head. Following spines slightly decreasing in length posteriorly, the last not much shorter than second spine. Soft dorsal rounded, higher than spinous part. First anal spine about one fourth of second, which is longer and stronger than third and somewhat more than longest dorsal spine. Soft anal somewhat pointed, about as deep as soft dorsal. Pectorals rounded, as long as head without snout; ventrals somewhat longer, their spine equal to postorbital part of head. Caudal truncate. Colour of preserved specimen dark brown above and on sides, lighter below, the two colours separated by a white band, running from lower posterior border of eye above pectoral to lower caudal rays. Above this band a similar one, beginning on snout, running above eye and along sides, broadening behind and continued on posterior soft dorsal rays and superior rays of caudal, which is white, with irregular dark brown more or less anastomizing bands. A third white band starts on middle of snout as a median single one, bifurcating above eye and running on each side below base of spinous dorsal, ending at base of last dorsal spine. Spinous dorsal light brown with a dark outer margin. Soft dorsal brown, with three longitudinal white bands, the superior of which beginning about on the fourth ray, the median complete and the inferior one only developed on the base of the posterior dorsal rays, being the continuation of the second band on the body. Anal and ventrals dark brown, pectorals hyaline. Length 223 mm.

Habitat: Celebes (Makassar, Menado); Flores!; Ternate. — Red Sea, coast of British India, Philippines, Marshall Islands.

9. **Plectorhynchus cuvieri** (Benn.)

Bodian cuvieri Bennett, Fishes Ceylon, 1830, p. 13.
Diagramma Sebae Bleeker, Verh. Bat. Gen. XXIII (1849), 1850, Sciaen. p. 24.
Diagramma lessonii Günther, Cat. Brit. Mus. I, 1859, p. 329 (nec. C.V.).
Plectorhynchus Sebae Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 283.
? *Diagramma sebae* Kner, Novara Exp. Fische I, 1865, p. 54.
Diagramma lessoni Günther, Fische der Südsee I, 1873—1875, p. 28 (nec C.V.).
Plectorhynchus Cuvieri Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 291. Atl. Ichth. VIII, 1876—1877, p. 21.
Diagramma cuvieri Day, Fishes of India. Suppl. 1888, p. 785. Fauna of British India, Fishes I, 1889, p. 516.
Plectorhynchus diagramma Jordan & Seale, Bull. Bur. Fish. XXV (1905), 1906, p. 267 (sine syn.).
Diagramma Sebae Pellegrin, Bull. Soc. Zool. France XXXIX, 1914, p. 226.
Plectorhinchus diagramma Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 206. Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 244 (partim).

D. XIII. 17. A. III. 8. P. 2. 15. V. I. 5. Ll. 93. Ltr. $\begin{array}{c}11\\ \hline 1\\ \hline 25\end{array}$.

Height 3, 3.8 in length with caudal. Head 2.9, 3.8 in length with caudal. Eye 3.8, 1.6 in snout and somewhat less than slightly convex interorbital space. Mouth slightly oblique. Maxillary not quite reaching to vertical through frontborder of eye. A band of about seven irregular rows of small teeth in the upper jaw, with an outer series of enlarged ones. In the lower jaw a few rows of small teeth with two irregular outer rows of enlarged ones. Preoperculum rectangular, serrate behind. Dorsal notched between spinous and soft part. Dorsal spines strongly, heteracanth, the first half length of second, which is somewhat shorter than the third one. Third spine longest, equal to postorbital part of head. Spines gradually decreasing in length to tenth, which is subequal to the two following spines. Anterior soft rays as long as last spine, following rays gradually increasing in length, the longest about as long as sixth spine. Posterior rays rapidly decreasing in length, the fin rounded behind. First anal spine one fourth of second, which is somewhat stronger, but scarcely longer than third and equal to postorbital part of head. Soft anal gently rounded, as deep as soft dorsal. Pectorals and ventrals subequal, as long as head without snout. Ventral spine somewhat shorter than postorbital part of head. Caudal slightly emarginate.

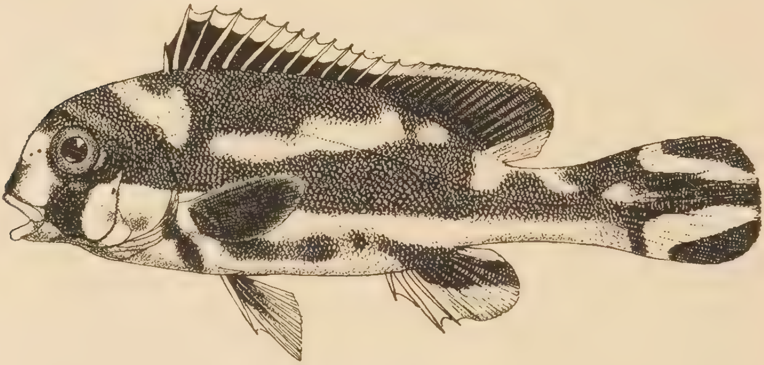

Fig. 83. *Plectorhynchus orientalis* (Bl.) × $^5/_7$.

Least height of caudal peduncle about 1.5 in its length. Colour of preserved specimen yellowish, with broad transverse black bands, much broader than interspaces on the back, narrower than the interspaces on the sides and belly. The first along base of spinous dorsal, joining that of the other side just before that fin, all the other bands are also united with the corresponding one of the other side on the head, the bands remaining here horizontal. Second and third band from base of soft dorsal over occiput, fourth to sixth from base of caudal, the fourth along upperborder of eyes, the fifth through eyes and the sixth, which is double on snout, through base of pectorals and below eyes. Seventh from end of base of anal over end of snout, the eighth indistinct, on belly. Spinous dorsal light brownish at base, yellowish in the middle and blackish brown in the terminal third. Soft dorsal, anal and caudal yellowish with a brownish margin and with rather large brown spots. Ventrals and pectorals yellowish, lastnamed with a brown band at base. Length 410 mm.

Nomen indig.: Gadji (Malay).

Habitat: Pulu Weh!; Sumatra (Padang, Siboga); Batu Islands; Celebes (Makassar); Ambon; Banda; New Guinea (Manokwari); Mysore. — Madagascar, Zanzibar, coast of British India, Ceylon, Hongkong, Philippines, Solomon Islands, Samoa, In sea.

10. **Plectorhynchus orientalis** (Bl.) (Fig. 83, p. 424)

Anthias orientalis Bloch, Ausländ. Fische VII, 1793, p. 10.
Lutjanus aurantius Lacépède, Hist. Nat. Poissons IV, 1802, p. 239.
Serranus orientalis Cuvier & Valenciennes, Hist. Nat. Poissons II, 1828, p. 318.
Diagramma pica Cuvier & Valenciennes, ibid. V, 1830, p. 297.
Diagramma orientale Cuvier & Valenciennes, ibid. p. 299.
Diagramma Sibbaldi Bennett, Proc. Zool. Soc. London 1832, p. 182.
Diagramma orientale Bleeker, Verh. Bat. Gen. XXIII (1849), 1850. Sciaen. p. 23.
Diagramma orientale Günther, Cat. Brit. Mus. I, 1859, p. 326.
? *Diagramma picoides* Peters, Monatsber. Akad. Berlin 1866, p. 94.
Diagramma orientale Günther, Fische der Südsee I, 1873—1875, p. 28.
Diagramma orientale Day, Fishes of India, 1875—1888, p. 80.
Plectorhynchus orientalis Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 295. Atl. Ichth. VIII, 1876—1877, p. 22.
Plectorhynchus orientalis Jordan & Richardson, Bull. Bur. Fish. XXVII (1907), 1908, p. 259.

D. XIII. 18 or XIV. 17. A. III. 8. P. 2. 15. V. I. 5. Ll. 80. Ltr. $\begin{array}{c}13\\ \hline 1\\ \hline 23\end{array}$.

Height 2.9, 3.8 in length with caudal. Head 3.3, 4.4 in length with caudal. Eye 3.4, 1.5 in snout and equal to convex interorbital space. Mouth somewhat oblique. Maxillary reaching nearly to below frontborder of eye. Teeth in about five rows in the jaws, the outer series in the upper jaw enlarged. Preoperculum rounded, denticulate behind. Dorsal notched. First dorsal spine half length of second. Second, third and fourth spines subequal, longest, slightly more than postorbital part of head. Spines gradually decreasing in length posteriorly, the last one about two thirds of the longest. Soft dorsal rounded behind. The first soft ray not much longer than last spine. The following rays decreasing in length to the fourteenth, which is somewhat longer than longest spine. First anal spine minute, second one longer and stronger than third, somewhat more than postorbital part of head. Soft anal rounded, longest ray slightly longer than longest ray of soft dorsal. End of anal below eighth ray of soft dorsal. Pectorals slightly longer than ventrals, equal to head without snout. Ventral spine somewhat more than postorbital part of head. Caudal rounded. Least height of caudal peduncle about 1.5 in its length, giving the impression of being very slender, as the end of the anal is far more anterior than that of the dorsal. Colour of head, body and fins in preserved specimens light yellowish with broad dark brown bands and large patches, which are more developed in young than in older specimens. A patch on snout. An irregular band from eye to end of caudal, the bands of both sides connected by a double or single broad band above and behind eyes. Another branch runs from eye to corner of mouth and is connected with that of the other side over isthmus. A large patch, connected or not with the longitudinal band behind head, covering the greater part of the back, the basal half of the spinous dorsal and, broadening posteriorly, covering more and more of the soft dorsal, till it colours the whole of the fin between about the tenth and the fourteenth ray. The posterior part of the dorsal is again white. At this point it is again connected with the median band through an irregular ventral prolongation. A band from base of pectoral to base of anal, on which fin it widens, forming a large patch. This band may be continuous or interrupted. Caudal with a broad band along upper and lower lobe. Pectorals black, with a narrow white margin. Ventrals yellowish with or without a small dark patch. Spinous dorsal sometimes with a narrow dark margin. Length 152 mm.

Habitat: Pulu Weh!; Sumatra (Benkulen); Java (Patjitan); Bali; Timor; Ternate; Buru; Ceram; Ambon! — Mauritius, Zanzibar, coast of British India, Philippines, Samoa, Tahiti.

In sea.

11. **Plectorhynchus pictus** (Thunb.)

Perca picta Thunberg, K. Vet. Ac. Nya Handl. XIII, 1792, p. 141.
Grammistes pictus Bloch Schneider, Syst. Ichthyol. 1801, p. 190.
Holocentrus radjabou Lacépède, Hist. Nat. Poissons IV, 1802, p. 335, p. 374.
Lutjanus pictus Lacépède, ibid. V, 1803, p. 687, p. 688.
Diagramma lineatum Rüppell, Atl. Reise N. Afrika, Fische 1828, p. 125 (nec L.).
Diagramma punctatum Rüppell, ibid. p. 126.
Diagramma cinerascens Rüppell, ibid. p. 127.
Diagramma punctatum Cuvier & Valenciennes, Hist. Nat. Poissons V, 1830, p. 302.

Diagramma ocellatum (Kuhl & van Hasselt), Cuvier & Valenciennes l.c.

Diagramma cinerascens Cuvier & Valenciennes, ibid. p. 307.

Diagramma centurio Cuvier & Valenciennes, ibid. p. 308.

Diagramma poecilopterum Cuvier & Valenciennes, ibid. p. 314.

Diagramma balteatum (Kuhl & van Hasselt), Cuvier & Valenciennes, ibid. p. 316.

Diagramma punctatum Quoy & Gaimard, Voyage Astrolabe, Poissons 1834, p. 699.

Diagramma punctatum Rüppell, Neue Wirbelthiere, Fische 1837, p. 125.

Diagramma lineatum Rüppell, l.c. (nec. L.).

Diagramma punctulatum Bleeker, Nat. Geneesk. Arch. Ned. Indië II (3), 1845, p. 522 (errore).

Diagramma punctatum Schlegel, Fauna Japonica 1850, p. 60.

Diagramma poecilopterum Schlegel, ibid. p. 61.

Diagramma pictum Schlegel, ibid. p. 62.

Plectorhynchus blochii Cantor, Journ. Asiat. Soc. Bengal XVIII, 1850, p. 1059 (nec C.V.).

Plectorhynchus bateatus Cantor, ibid. p. 1060.

Diagramma punctatum Bleeker, Verh. Bat. Gen. XXIII (1849), 1850. Sciaen. p. 25.

Diagramma punctatum Günther, Cat. Brit. Mus. I, 1859, p. 323.

Diagramma pictum Günther, ibid. p. 327.

Plectorhynchus punctatus Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 282.

Diagramma punctatum Kner, Novara Exp. Fische I, 1865, p. 54.

Diagramma punctatum Playfair, Fishes of Zanzibar 1866, p. 27.

Diagramma centurio Playfair, l.c.

Diagramma ocellatum Jouan, Mém. Soc. Sc. Nat. Cherbourg XIII (Ser. 2. III), 1867, p. 257.

Diagramma punctatum Klunzinger, Verh. zool. bot. Ges. Wien XX, 1870, p. 734.

Diagramma lineatum Klunzinger, ibid. p. 735.

Diagramma cinerascens Klunzinger, l.c.

Plectorhynchus poecilopterus Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 139.

Plectorhynchus pictus Bleeker, ibid. p. 298.

Diagramma pictum Day, Fishes of India 1875—1888, p. 81.

Diagramma punctatum Day, ibid. p. 83.

Plectorhynchus pictus Bleeker, Atl. Ichth. VIII, 1876—1877, p. 24.

Diagramma punctatum Klunzinger, Sitzber. Akad. Wien 1880, p. 351.

Diagramma centurio Macleay Proc. Lin. Soc. New S. Wales VII, 1882, p. 238.

Diagramma labiosum Macleay, ibid. VIII, 1883, p. 202.

Diagramma pictum Klunzinger, Fische des rothen Meeres I, 1884, p. 30.

Diagramma punctatum Macleay, Proc. Lin. Soc. New S. Wales IX, 1884, p. 13.

Diagramma centurio Sauvage, Poissons de Madagascar 1891, p. 166.

Plectorhynchus pictus Steindachner, Ann. Hofmus. Wien XI, 1896, p. 198.

Plectorhynchus radjaban Jordan & Evermann, Proc. U. S. Nat. Mus. XXV, 1902, p. 349.

Plectorhynchus poecilopterus Jordan & Evermann, l.c.

Plectorhinchus (Spilotichthys) radjabau Fowler, Journ. Acad. Nat. Sci. Philadelphia (2) XII, Prt. IV, 1904, p. 528.

Spilotichthys pictus Jordan & Seale, Bull. Bur. Fish. XXVI (1906), 1907, p. 22.

Spilotichthys labiosus Ogilby, Proc. Royal Soc. Queensland XXI, 1908, p. 25.

Plectorhynchus pictus Jordan & Thompson, Proc. U. S. Nat. Mus. XLI, 1912, p. 546.

Plectorhynchus diagramma Snyder, ibid. XLII, 1912, p. 500.

Plectorhynchus (Diagramma) pictus Mc Culloch, Biol. Results "Endeavour" IV, 4, 1916, p. 184. Check-list of fish. N. S. Wales, Prt. II, 1919, p. 57.

Plectorhinchus punctatus Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, p. 34.

Plectorhinchus pictus Fowler & Bean, ibid. p. 35.

Plectorhynchus pictus Barnard, Ann. S. Afric. Mus. XXI, 1925—1927, p. 670.

Plectorhinchus pictus Fowler, Mem. B. P. Bishop Mus. X, 1928, p. 207. Bull. U. S. Nat. Mus. Vol. XI, 1931, p. 260.

D. IX—X. 23—26. A. III. 7—8. P. 2. 14—15. V. I. 5. Ll. 88—100. Ltr. $\begin{array}{c}17-19\\ \hline 1\\ \hline 30-32\end{array}$.

Height 2.5—2.7, 3.1—3.4 in length with caudal. Head 3—3.5, 3.8—4.2 in length with caudal. Eye 3.2—4, 1.2—1.7 in snout and equal to or somewhat more than convex interorbital space. Mouth somewhat oblique. Maxillary reaching to below frontborder of eye or not quite so far. Teeth in jaws in four or five rows, with an outer series of enlarged ones. Preoperculum rectangular, rounded at angle, denticulate behind. Origin of dorsal before vertical through hindborder of operculum. Dorsal scarcely notched. First dorsal spine less than half length of second, which is longest and equal to postorbital part of head, or to head without snout in young specimens. Following spines gently decreasing in length, last spine about seven eighths of second spine. First soft dorsal ray about equal to last spine, following spines gently increasing in length to about the fifteenth, which is as long as second spine. Following spines rapidly decreasing in length, the fin rounded behind. First anal spine minute, second and third subequal, about as long as postorbital part of head. Soft anal truncate behind, as deep as soft dorsal. Pectorals and ventrals subequal, somewhat more than head without snout. Caudal rounded in young, truncate or slightly emarginate in adult specimens. End of anal below tenth soft ray of dorsal. Least height of caudal peduncle almost 1.5 in its length. Colour of preserved specimens: In the young, up to about 100 mm head and body lighter or darker brown above, belly and three longitudinal bands margaritaceous; the upper band along base of dorsal, uniting at nape into a single median one with that of the other side, continued to end of snout. The second from middle of snout, above eye, to end of upper caudal lobe. The third from snout, below eye to lower caudal lobe, separated from the margaritaceous belly by a small brown stripe only, which is more or less dissolved into spots. Fins dark, dorsal with a white submarginal longitudinal band. In older specimens the bands are more numerous and the brown interspaces are dissolved into rows of spots on the body, dorsal and caudal. Anal brown, pectorals hyaline or yellowish. In still older specimens the spots too disappear or are indistinct. The upper margin of the dorsal, the hindmargin and sometimes also the lower margin of the anal remain dark, as also sometimes the ventrals. Length 610 mm.

Nomen indig.: Gadji (Malay Batavia), Dumbak (Balikpapan), Radjabau (Moluccos).

Habitat: Singapore!; Sumatra (Priaman, Padang); Nias; Bintang; Banka; Java (Batavia!, Bantam, Japara); Duizend Islands; Bawean; Borneo (Balikpapan!, Sandakan); Danawan Island; Celebes (Makassar!, Bulukomba, Badjoa); Postillion Islands!; Batjan; Ternate; Ceram; Ambon; Misol; New Guinea. — Coast of Natal, Madagascar, Mozambique, Zanzibar, Red Sea, Aden, Persian Gulf, Seychelles, coast of British India, Ceylon, Andamans, Tonkin, China, Formosa, Japan, Philippines, coast of Queensland and New South Wales, New Caledonia, Fiji Island.

In sea.

Doubtful species

Plectorhynchus griseus (C.V.).

Sauvage, Poissons de Madagascar 1891, p. 167 records a specimen of this species from Batavia, which he received from Bleeker. There must be some mistake here, as it is incredible that Bleeker would have done so without mentioning the occurence of this species in the Indo-australian Archipelago in one of his papers.

4. Subfam. LETHRININAE

Body oblong, somewhat compressed, covered with ctenoid scales of moderate size. Head naked, with exception of operculum and nape, preoperculum naked. Mouth terminal, slightly protractile. Premaxillaries with rather long pedicels and short rami, the latter without posterior expansions or processes and with their distal ends internal to the maxillaries. Maxillary with a moderately broad posterior expansion, which is overlapped by a flattish downwardly curved branch of the maxillary process of the palatines; outer face of palatine without ridge. Gillmembranes broadly united, but free from isthmus. Subocular shelf vestigial, a minute process of the second suborbital at its junction with the first. Anterior teeth cardiform, with canines. Lateral teeth in a single row, conical or molarlike. Palate toothless. A single dorsal, consisting of X spines and 9 branched rays. Anal with III spines and 5 branched rays. Caudal emarginate.

Distribution: That of the single genus.

Lethrinus Cuvier

(Cuvier, Règne Animal, 2 Ed. 1829, p. 182)

Lethrinella Fowler, Journ. Acad. Nat. Sci. Philadelphia (2) XII, 1904, p. 529.
Lethrinichthys Jordan & Thompson, Proc. U. S. Nat. Mus. XLI, 1912, p. 558.

Body oblong, somewhat compressed, covered with ctenoid scales of moderate size (Ll. 40—50). Lateral line continuous. Head more or less pointed. Interorbital space, snout, preorbital, cheeks, including preoperculum naked. Operculum scaly and with a single flat spine. Squamation on body beginning on nape, behind eye, with two distant rows of scales. Mouth rather small, lips thick. Upper jaw slightly protractile. Teeth in the jaws cardiform in front, with a few canines near symphysis. Lateral teeth in a single series, conical and more or less pointed in young; in some species they remain conical through life, in others they become rounded and molarlike, with a depression in the middle, especially the hinder ones. Palate toothless. Six branchiostegals. One dorsal fin, consisting of X heteracanth slender spines and 9 branched rays. Anal fin beginning below last dorsal spine, with III spines, the first of which is much smaller than the others, and 8 branched rays. Pectorals long and pointed. Ventrals with a slender spine and five branched rays. Caudal incised, the lobes pointed or rounded.

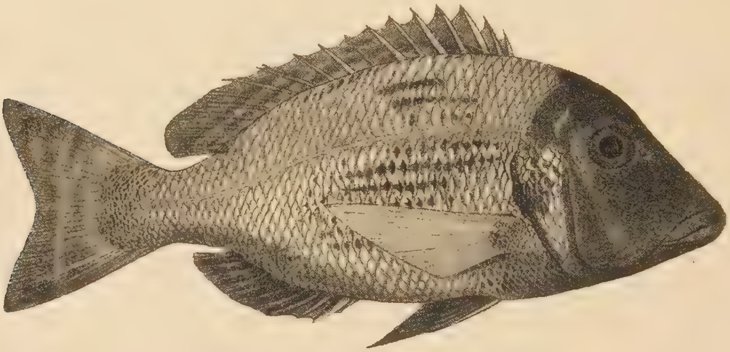

Fig. 84. *Lethrinus nebulosus* (Forsk.) × 1/4.

Distribution: Coasts of Indic and warm part of Pacific. One species on the western coast of tropical Africa.

Note: The species of this genus are very difficult to distinguish. The finformulae and the squamation are remarkably uniform in all species. A good character in distinguishing the species is however the number of rows of scales between the *middle* of the spinous dorsal and the lateral line (these numbers are given here below as "Ltr." in the description of each species). As Klunzinger (Fische des rothen Meeres) has already pointed out, these rows are of no value, when counted at *origin* of dorsal, as has been done by many authors. There are generally 6—6½ rows here, even in species which have 4—4½ rows below median dorsal spines. The form of body and head, the length of the snout are of importance in some cases, in other species they vary greatly. Another good character can be found in the lateral teeth. As said above, these teeth are conical in the young of all species and change into molars in some species, remaining conical in others. The difficulty lays here with young specimens, but in many cases the hindermost teeth change in a fairly young stage in those species, which have molars in the adult. The colour is very variable, even in life, as Herre & Montalban (Philipp. Journ. of Science XXXIII. 1927) have shown.

Key to the Indo-australian species of Lethrinus

1. Maxillary reaching to below anterior border of eye (Fig. 85). Base of soft anal less than longest soft anal rays. Soft dorsal with dark marmorations. 4½ scales between lateral line and median dorsal spines . . . 1. *L. kallopterus.* p. 432.
2. Maxillary reaching to below nostrils. Base of soft anal longer than longest anal rays[1].
   A. 4—4½ scales between lateral line and median dorsal spines. Lateral teeth in jaws conical, in young and adults.
      a. Second dorsal spine produced . . . 2. *L. nematacanthus.* p. 433
      b. Second dorsal spine not produced, shorter than third one.
         a^1. Height 3.3—3.5. Eye 3—3.8 . . . 3. *L. variegatus.* p. 435.
         b^1. Height 3—3.3. Eye 4—5.3 (Fig. 87) 4. *L. microdon.* p. 436.
         c^1. Height 2.8—3.1. Eye 3.4—4.5. (Fig. 88) . . . . 5. *L. reticulatus.* p. 438.
         d^1. Height 2.1—2.4. (in adults) Eye 3.8—4 . . . . 6. *L. haematopterus.* p. 440.
   B. 4½ scales between lateral line and median dorsal spines. Lateral teeth in jaws molarlike, at least posterior ones in adults.

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[1] With exception of *L. hypselopterus.*

a. Base of soft anal less than longest soft anal rays . . . . 7. *L. hypselopterus.* p. 443.
b. Base of soft anal more than longest soft anal rays . . . . 8. *L. mahsena* p. 444.

C. 5—5½ scales between lateral line and median dorsal spines. Lateral teeth in jaws conical, pointed, even in large specimens. Snout long and pointed (Fig. 89) 9. *L. miniatus.* p. 445.

D. 5—5½ scales between lateral line and median dorsal spines. Posterior teeth in the jaws molarlike, at least in adults.
a. Snout blunt (Fig. 90). Height 2.4—2.8. Eye 3—3.5. Uniform or with light longitudinal bands . . . . 10. *L. ornatus.* p. 447.
b. Eye twice or more in pointed snout.
*a*¹. A black blotch above origin of anal. Third anal spine more than eye. Head as long as high. Eye 3—3.6 11. *L. rhodopterus.* p. 450.
*b*¹. No black blotch above origin of anal. Third anal spine more than eye. Head longer than high. Eye 3.9—4.2 . . . . 12. *L. leutjanus.* p. 451.
*c*¹. No black blotch above origin of anal. Third anal spine as long as eye. Head as long as high. Eye 3.4—4.1. (Fig. 84) . . . . 13. L. *nebulosus.* p. 453.
*d*¹. No black blotch above origin of anal. Third anal spine more than eye. Head as long as high. Eye 4.1. Dorsal and anal rays with dark annulations . . . . 14. *L. ramak.* p. 455.

1. **Lethrinus kallopterus** Blkr. (Fig. 85, p. 433)

Lethrinus kallopterus Bleeker, Act. Soc. Indo-Neerl. I. 1856. Beschr. visch. Menado, p. 47. Ned. Tijdschr. Dierkunde IV (1872), 1873, p. 324. Atl. Ichth. VIII, 1877, p. 113.
Lethrinus kallopterus Herre & Montalban, Philip. Journal of Science XXXIII, 1927, p. 408.
Lethrinus amboinensis Fowler, Mem. Bishop Mus. X. 1928, p. 216.
Lethrinus kallopterus Fowler, U. S. Nat. Mus. Bull. 100. Vol. XII. 1933, p. 30.

D. X. 9. A. III. 8. P. 1. 12. V. I. 5. Ll. 48. Ltr. $\begin{array}{c}4\frac{1}{2}\\ \hline 1\\ \hline 18\end{array}$.

Height 2.6—2.8, 3.1—3.2 in length with caudal. Head 2.6—2.7, 3—3.1 in length with caudal. Eye 3.8—4.4, somewhat more or less than interorbital space, 2.4 in snout. Mouth large, slightly oblique. Maxillary reaching to below anterior border of eye. Canines curved, rather large, lateral teeth conical with rounded tips. Fifth dorsal spine longest, somewhat longer than eye and less than longest soft dorsal rays. Second and third anal spine of same length, slightly less than longest soft dorsal spine and much less than longest soft anal rays, which are longer than base of soft anal. Pectorals longer than ventrals, somewhat shorter than head. Caudal moderately incised, the lobes rounded. Colour of alcohol specimens brownish with traces of lighter longitudinal stripes. Soft dorsal with dark marmorations. Length 500 mm. (Specimens of Bleeker's collection in the Leiden Museum seen by us).

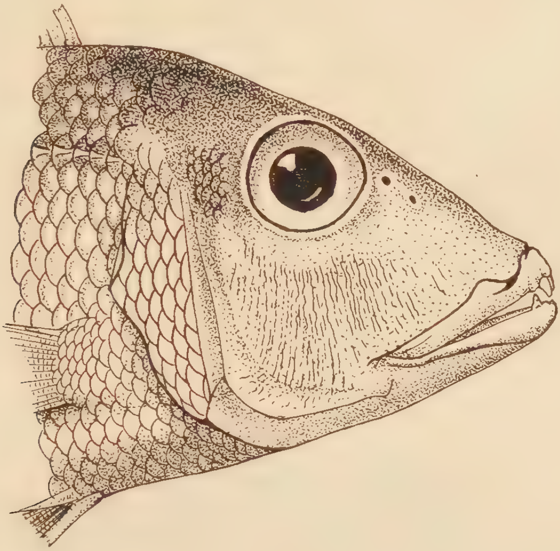

Fig. 85. *Lethrinus kallopterus* Blkr. × $^3/_4$.

Habitat: Simalur!; Celebes (Menado, Kait Point, Libani Bay, Labuandata Bay, Gulf of Boni); Tomahu Island; Batjan; Gomomo Island; Pitt Passage; New Guinea. — Philippines, Hongkong, Samoa.

In sea.

2. **Lethrinus nematacanthus** Blkr. (Fig. 86, p. 434)

Lethrinus nematacanthus Bleeker, Nat. Tijdschr. Ned. Indië VI, 1854, p. 403. Verh. Bat. Gen. XXVI, 1854—1857, Nieuwe nalez. Ichthyol. Japan. p. 90. Ned. Tijdschr. Dierk. IV, (1872), 1873, p. 327. Atl. Ichth. VIII, 1877, p. 114.
Lethrinus nematacanthus Günther, Cat. Brit. Mus. I, 1859, p. 456.
Lethrinus nematacanthus Macleay, Descr. Cat. Austral. Fish. I, 1881, p. 112.
Lethrinus nematacanthus Evermann & Seale, Bull. Bureau Fish. XXVI, 1906, p. 86.

Lethrinus nematacanthus Jordan & Thompson, Proc. U. S. Nat. Mus. XLI, 1912, p. 559.
Lethrinus nematacanthus Herre & Montalban, Philip. Journal of Science. XXXIII, 1927, p. 401.
Lethrinus nematacanthus Fowler, Mem. Bishop Museum X, 1928, p. 215. Bull. U. S. Nat. Museum. Vol. XII, 1933, p. 11.

D. X. 9. A. III. 8 P. I. 12. V. I. 5. Ll. 46—47. Ltr. $\begin{array}{c} 4\frac{1}{2} \\ \hline 1 \\ \hline 15-16 \end{array}$.

Height 3, 3.6—3.7 in length with caudal. Head 2.8—3, 3.3—3.6 in length with caudal. Eye 3.4— 3.6, equal to the very slightly convex interorbital space. Relative length of sides of triangle formed by middle of pupil, angle of preoperculum and point of snout, in this sequence: 1 : 1.5—1.6 : 1.1—1.2. Mouth slightly oblique, its corner below posterior nostril. Canines slightly curved, moderate, the lateral ones in the lower jaw longer and much directed backwards. Lateral teeth conical, becoming smaller and more pointed anteriorly. Five and a half rows of scales between origin of dorsal and lateral line. Dorsal spines slender, the second one produced into a filament, as long as distance between corner of mouth and base of pectoral. Origin of anal separated by 15 scales from lateral line, below last dorsal spine. Second anal spine somewhat thicker and slightly shorter than third spine, which equals the diameter of the eye. End of anal below end of dorsal. Ventral shorter than pectorals, which are as long as eye and snout.

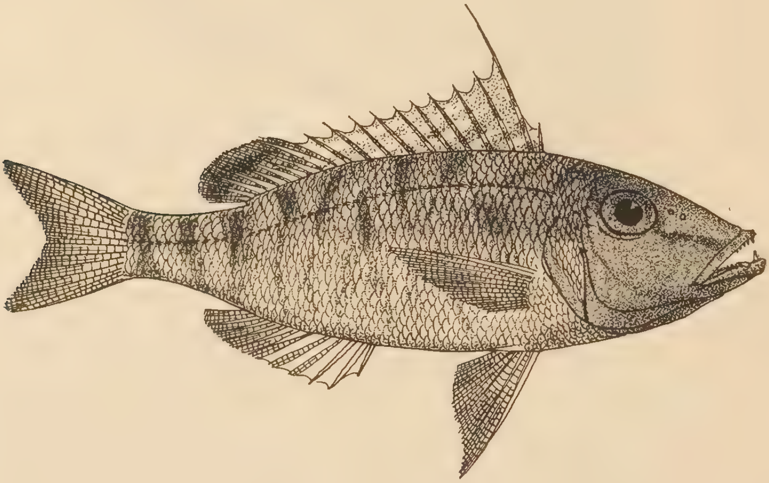

Fig. 86. *Lethrinus nematacanthus* Blkr. × 4/7.

Caudal feebly incised. Least height of caudal peduncle twice in its length. Colour of alcohol specimens brownish, belly silvery. A dark spot, immediately below lateral line, above middle of pectorals. Body with more or less distinct wavy dark narrow bands. Vertical fins more or less spotted, pectorals and ventrals yellowish. Length 242 mm.

Habitat: Karimata Islands!; Celebes (Makassar!, North Celebes); Ambon! — From Japan, Philippines, eastwards to Southern Queensland, New South Wales and Louisade Archipelago. In sea.

3. **Lethrinus variegatus** C.V.

Lethrinus variegatus Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 287.
Lethrinus elongatus Cuvier & Valenciennes, t.c. p. 289.
Lethrinus semicinctus Cuvier & Valenciennes, t.c. p. 294.
Lethrinus latifrons Rüppell, Neue Wirbelthiere, Fische 1840, p. 118.
Lethrinus latifrons Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 220.
Lethrinus latifrons Playfair, Fishes of Zanzibar, 1866, p. 44.
Lethrinus variegatus Klunzinger, Verhandl. zool. bot. Gesellsch. Wien XX, 1870, p. 751. Fische des rothen Meeres I, 1884, p. 38.
Lethrinus variegatus Sauvage, Poissons de Madagascar 1891, p. 201.
Lethrinus semicinctus Sauvage l.c. p. 202.
Lethrinus variegatus Bleeker, Atl. Ichth. VIII, 1877, p. 117.
Lethrinus variegatus Evermann & Seale, Bull. Bureau Fish. XXVI, 1906, p. 86.
Lethrinus amboinensis M. Weber, Siboga Exp. Fische 1913, p. 288 (nec Blkr.).
Lethrinus variegatus Herre & Montalban, Philippine Journal of Science XXXIII, 1927, p. 409.
Lethrinus variegatus Fowler, Bull. U. S. Nat. Mus. Vol. XII, 1933, p. 39.

D. X. 9. A. III. 8. P. 1. 12. V. I. 5. Ll. 47. Ltr. $\frac{4-4\frac{1}{2}}{\frac{1}{15-16}}$.

Height 3.3—3.5, 3.9—4.2 in length with caudal. Head 2.8—3, 3—3.5 in length with caudal. Eye oblong, 3—3.8. Interorbital space somewhat less than eye, nearly flat. Relative length of sides of triangle, formed by middle of pupil, angle of preoperculum and snout, in this sequence, 1 : 1.6—1.9 : 1.4. Mouth slightly oblique, jaws equal. Maxillary reaching to below posterior nostril. Lips rather thick. Canines small, somewhat curved. Lateral teeth conical, pointed. Five to six scales between origin of dorsal and lateral line. Dorsal spines slender, first one more than half of second, fourth longest, equal to distance between hindborder of preoperculum and frontborder of eye, longer than soft dorsal rays. Origin of anal separated by 15 scales from lateral line, below last dorsal spine. Second anal spine thicker but not longer than third, as long as eye and about as long as longest soft anal rays. Pectorals equal to eye and snout, ventrals shorter, as long as postorbital part of head. Caudal forked, its lobes pointed. Least height of caudal peduncle twice in its length. Colour of alcohol specimens light brownish above, silvery below. In young specimens a brownish band from snout through eye. In older specimens the body has more or less distinct dark crossbands, which disappear in large specimens. Fins yellowish. Ventrals leaden-colour. Length 340 mm. (Type of *L. variegatus* in the Paris Museum seen by us).

Habitat: Java (Batavia!); Celebes (Makassar!, Bulucomba, Menado); Flores!; Timor; Halmahera; Ternate; Buru; Ceram; Ambon; Nusa Laut!; Banda; Kei Islands!, New Guinea. — Madagascar, Mossambique, Red Sea, Ceylon, Philippines, Tahiti.

In sea.

Note: Sauvage (Poissons de Madagascar p. 198) discussing *L. microdon,* says that *variegatus, elongatus* and *semicinctus* have to be united under the name *variegatus,* but on p. 201 he describes *variegatus* (with *elongatus* as synonym) and on p. 202 *semicinctus* as two different species, based on the types of Cuvier & Valenciennes. Comparision of his descriptions and figures has not convinced us. We think that his first statement is right and that the three species of Cuvier & Valenciennes are only one.

We do not think Klunzinger is right in supposing that *L. moensi,* as described by Günther (Südseefische) belongs to *variegatus.* The snout is less elongate and we do not see any difference with *L. moensi* Blkr. (= *reticulatus* C.V.).

4. **Lethrinus microdon** C.V. (Fig. 87, p. 437)

Lethrinus microdon Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 295.
Lethrinus ramak Klunzinger, Verh. zool. bot. Ges. Wien XX, 1870, p. 752. (nec Forsk.).
Lethrinus rostratus Day, Fishes of India, 1875—1888, p. 134 (nec C.V.).
Lethrinus ramak Kossmann & Rauber, Verh. Naturh. Med. Ver. Heidelberg I, 1876, p. 17 (nec Forsk.),
Lethrinus acutus Klunzinger, Fische des rothen Meeres I, 1884, p. 39.
Lethrinus miniatus Day, Fishes of Brit. India II, 1889, p. 37 (nec Bl. Schn.).
Lethrinus microdon Sauvage, Poissons de Madagascar 1891, p. 198.
Lethrinus acutus Pfeffer, Jahrb. Hamb. wissensch. Anst. X, 1893, p. 10.
Lethrinus acutus Steindachner, Denkschr. Akad. Wien LXXI, 1902, p. 133.
? *Lethrinus ramak* Herre & Montalban, Philipp. Journal of Science XXXIII, 1927, p. 411 (nec Forsk.).
Lethrinus genivittatus Fowler, Bull. U.S. Nat. Mus. Vol. XII, 1933, p. 42.

D. X. 9. A. III. 8. P. 1. 12. V. I. 5. Ll. 47. Ltr. $\begin{array}{c} 4\frac{1}{2} \\ \hline 1 \\ \hline 16 \end{array}$.

Dorsal profile sloping evenly to dorsal, snout rather pointed. Height 3—3.3, 3.7—4 in length with caudal. Head 2.7—2.9, 3.3—3.5 in length with caudal. Eye round, rather small, 4—5.3, equal to, or in large specimens, about 1.5 in interorbital space. Relative length of sides of triangle formed by middle of pupil, angle of preoperculum and snout (in this sequence) 1 : 1.6—1.9 : 1.4—1.5. Mouth very slightly oblique. Maxillary reaching to below posterior nostril, or to below anterior nostril in large specimens. Canines small, lateral teeth conical. Six scales between origin of dorsal and lateral line. Third, or third and fourth dorsal spines longest, somewhat more than postorbital part of head, equal to or longer than longest soft dorsal rays. Origin of anal below last dorsal spine, separated by 16 scales from lateral line. Second anal spine shorter than third or equal to it, as long as postorbital part of head and shorter than longest soft anal rays. Base of soft anal longer than longest soft anal rays. Pectorals as long as snout and eye, ventrals about one half diameter of eye shorter. Least height of caudal peduncle almost twice in its length. Caudal deeply incised. Colour of alcohol specimens brownish above, lighter below. Body with indistinct crossbands in young specimens and with a dark blotch between lateral line and middle of pectoral. Two or three brown stripes from anterior border of eye to upper jaw. Dorsal more or less clouded with darkish. Ventrals leaden-colour. Length 295 mm. (Type of *L. microdon* in Paris Museum seen by us).

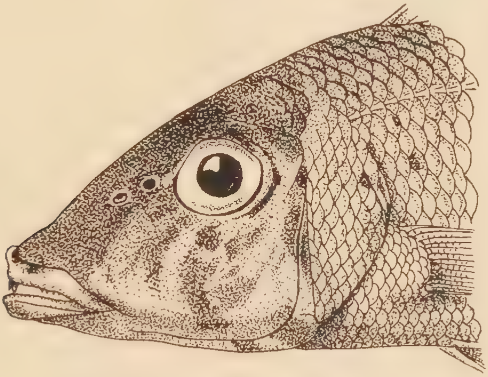

Fig. 87. *Lethrinus microdon* C.V. n.s.

Habitat: Celebes (Makassar!); Buru! — Zanzibar, Red Sea, coast of India, Philippines.

In sea.

Note: After having examined the type, we have no doubt, that *L. microdon* C.V., which has been rediscribed by Sauvage l.c., is the same as *L. acutus* Klz. Klunzinger had already pointed out, that *L. rostratus* of Day is not that species but *acutus*. Klunzinger first confounded this species with *L. ramak,* which is quite different. Herre & Montalban made the same mistake.

This species, which is said to be common in the Red Sea, from where we examined several specimens in the Leiden Museum, is apparently rare in the Indo-australian Archipelago.

5. **Lethrinus reticulatus** C.V. (Fig. 88, p. 439)

Lethrinus reticulatus Cuvier & Valenciennes, Hist. Nat. Poissons VII, 1830, p. 298.
Lethrinus reticulatus Bleeker, Nat. Tijdschr. Ned. Indië VI, 1854, p. 96.
Lethrinus amboinensis Bleeker, ibid. p. 490.
Lethrinus olivaceus Peters, Monatsber. Akad. Berlin 1855, p. 435.
Lethrinus Moensi Bleeker, Nat. Tijdschr. Ned. Indië IX, 1855, p. 435.
Lethrinus moensi Günther, Cat. Brit. Mus. I, 1859, p. 455.
Lethrinus amboinensis Günther, l.c.
? *Lethrinus genivittatus* Playfair, Proc. Zool. Soc. London 1867, p. 853.
? *Lethrinus Jagori* Peters, Monatsber. Akad. Berlin (1868), 1869, p. 257.
Lethrinus Moensi Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 328.
Lethrinus reticulatus Bleeker, l.c. p. 329.
Lethrinus amboinensis Günther, Fische der Südsee I, 1872—1875, p. 63.
Lethrinus moensi Günther, ibid. p. 64.
Lethrinus Moensi Bleeker, Atl. Ichth. VIII, 1876—1877, p. 115.
Lethrinus amboinensis Bleeker, ibid. p. 116.
Lethrinus reticulatus Bleeker, l.c.
? *Lethrinus reticulatus* Klunzinger, Sitzber. Akad. Wien 1880, p. 357.
Lethrinus reticulatus Macleay, Proc. Linn. Soc. N. S. Wales IX, 1884, p. 17.
Lethrinus moensii Perugia, Ann. Mus. Civ. Genova (2) VII, 1889, p. 273.
Lethrinus amboinensis Jordan & Seale, Bull. Bur. Fisheries XXVI (1906), 1907, p. 24.
Lethrinus moensii Evermann & Seale, Proc. U. S. Nat. Mus. XXXI, 1906, p. 509.
Lethrinus moensii Jordan & Richardson Bull. Bur. Fish. 1908, p. 259.
Lethrinus amboinensis Jordan & Richardson, Mem. Museum Carnegie 1909, p. 189.
Lethrinus amboinensis Seale, Philip. Journal of Science V, No. 4, 1910, p. 277.
Lethrinus moensi Snyder, Proc. U. S. Nat. Mus. XLII, 1912, p. 500.
Lethrinus amboinensis Snyder, l.c.
Lethrinus reticulatus M. Weber, Siboga Exp. Fische 1913, p. 287 (partim).
Lethrinus acutus M. Weber, ibid. p. 288 (nec Klunzinger).
Lethrinus moensi Herre & Montalban, Philip. Journal of Science XXXIII, 1927, p. 400.
Lethrinus amboinensis Herre & Montalban, ibid. p. 404.
? *Lethrinus ramak* Herre & Montalban, ibid. p. 411 (nec Forsk.).

Lethrinus amboinensis P. J. Schmidt, Transact. Pacific Com. of the Acad. of Science of the USSR I, 1930, p. 49.
Lethrinus reticulatus P. J. Schmidt, ibid. p. 124.
Lethrinus reticulatus Fowler, Bull. U. S. Nat. Mus. Vol. XII, 1933, p. 18.

D. X. 9 1). A. III. 8. P. 1. 12. V. I. 5. Ll. 47—48. Ltr. $\begin{array}{c}4-4\frac{1}{2}\\ \hline 1\\ \hline 15-16\end{array}$.

Height 2.8—3.1, 3.5—4 in length with caudal. Head 2.6—2.9, 3.2—4.5 in length with caudal. Eye 3.4—4.5. Interorbital space somewhat convex, equal to or more than eye. Relative length of sides of triangle, formed by middle of pupil, angle of preoperculum and snout (in this sequence) 1 : 1.4 : 1.2—1.4 and in specimens below 200 mm 1 : 1.6—1.8 : 1.4—1.5. Mouth slightly oblique, jaws subequal. Maxillary ending before vertical through anterior nostril. Canines rather strong. Lateral teeth conical, more or less pointed, in young as well as in older specimens. Origin of dorsal separated by 5—5½ scales from lateral line. Dorsal spines slender, the third or third and fourth longest and equal to distance between hind-border of eye and posterior nostril, somewhat more or less than longest soft dorsal rays. Origin of anal separated by 14 or 15 scales from lateral line, below last dorsal spine. Second anal spine somewhat stronger than third, the last equal to second or somewhat longer, equal to eye or somewhat less than eye and less than

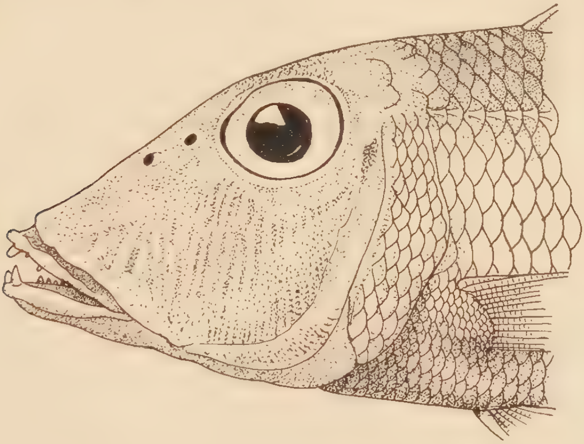

Fig. 88. *Lethrinus reticulatus* C.V. × 3/4.

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1) In one specimen we find D XI. 8, a very rare aberration, as the finformulae are remarkably constant in this genus.

longest soft anal rays. Pectorals pointed, as long as snout and eye or slightly less, ventrals equal to snout. Caudal deeply incised. Least height of caudal peduncle 1.5—1.8 in its length. Colour of alcohol specimens yellowish green or brownish above, silvery below. Head violet-brown. In young specimens, to about 200 mm, indistinct crossbars on the body, the first forming a transverse black patch above base of pectorals. A longitudinal black patch just below lateral line and above anal may be present. These markings obsolete in older specimens. Dorsal and anal spines and rays annulated with black, less distinct in older specimens. Pectorals, ventrals and caudal yellowish. Length over 390 mm. (Type of *L. reticulatus* in the Paris Museum and specimens of *L. moensi* of Bleeker's collection in the Leiden Museum seen by us).

Habitat: Puluh Weh!; Nias!; Borneo (Sandakan); Paternoster Islands!; Celebes (Menado!); Buton!; Sulu Islands!; Batjan; Obi; Ternate; Halmahera; Ambon; Ceram!; Flores; Timor; Mysore; New Guinea! — Mossambique, Seychelles, Riu Kiu Islands, Formosa, Philippines, Pelew Islands, North Australia, eastwards to Paumotu Islands.

In sea.

Note. Bleeker already thought it possible, that *reticulatus* is the young stage of *moensi* and P. J. Schmidt has recently united the two. After having examined the type of *L. reticulatus* we come to the same conclusion. The specimens described by Herre & Montalban as *L. ramak*, are certainly not that species, which has molars and one scale more between lateral line and middle dorsal spines. Possibly they belong to *L. reticulatus.*

6. **Lethrinus haematopterus** Schl.

Lethrinus haematopterus Schlegel, Fauna Japonica, Pisces 1842, p. 74.

Lethrinus haematopterus Richardson, Fishes of the Voyage of the Sulphur. 1844, p. 144.

Lethrinus haematopterus Bleeker, Verh. Bat. Gen. XXVI, 1854—1857. Nieuwe nalez. ichth. Japan, p. 91.

Lethrinus richardsoni Günther, Cat. Brit. Mus. I, 1859, p. 456.

Lethrinus haematopterus Kner, Novara Exp. Fische 1865, p. 80.

Lethrinus haematopterus Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 323. — Atl. Ichth. VIII, 1876—1877, p. 112.

Lethrinus Richardsoni Klunzinger, Sitzber. Akad. Wien. 1880, p. 357.

Lethrinus Richardsoni Macleay, Descr. Cat. Austr. Fish. I, 1881, p. 113.

Lethrinus haematopterus Nyström, Bihang till K. Sv. Ved. Akad. Handl. XIII, Afd. IV, No. 4. 1887, p. 15.

Lethrinus haematopterus Franz, Abh. Bayer. Akad. Wiss. IV. Suppl. I. 1910, p. 47.

Lethrinus haematopterus Jordan & Thompson, Proc. U. S. Nat. Mus. XLI. 1912, p. 560.

Lethrinus haematopterus Jordan, Tanaka & Snyder, Journ. Coll. Sci. Univ. Tokyo. XXXIII. art. 1. 1913, p. 172.

Lethrinus richardsoni Herre & Montalban, Philipp. Journ. Science XXXIII. 1927, p. 405.

Lethrinus frenatus Fowler, Bull. U. S. Nat. Mus. Vol. XII. 1933, p. 28 (partim?).

D. X. 9. A. III. 8. P. 1. 12. V. I. 5. Ll. 49. Ltr. $\begin{array}{c}4\frac{1}{2}\\ \hline 1\\ \hline 16\end{array}$.

Dorsal profile steeply ascending from snout to dorsal. Nape more or less keeled. Young specimens are much more slender. Height 2.1—2.4, 2.7—2.9 in length with caudal (2.7 and 3.4 in a specimen of 96 mm length). Head 2.8, 3.4—3.6 in length with caudal. Eye 3.8—4 (2.8 in specimen of 96 mm), slightly more than convex interorbital space, and twice or somewhat less than twice in snout. Relative length of sides of triangle, formed by middle of pupil, angle of preoperculum and snout (in this sequence) 1 : 1.4 : 1.2. Mouth slightly oblique. Maxillary reaching to below anterior nostril. Canines rather strong, all lateral teeth conical. Six scales between origin of dorsal and lateral line. Fourth and fifth dorsal spines longest, equal to postorbital part of head and half eye, slightly shorter than longest dorsal rays. Origin of anal below last dorsal spine, separated by 16 scales from lateral line. Second anal spine somewhat stronger than third, equal to it in length or somewhat longer, as long as soft anal rays. Base of soft anal more than longest soft anal rays. Ventrals equal to snout and half eye, pectorals more than one eyediameter longer. Caudal deeply incised. Least height of caudal peduncle 1.5 in its length. Colour of alcohol specimens uniform or with traces of a blotch between lateral line and middle of pectoral. Length 240 mm. (The specimens from Japan, on which Schlegel based the species and specimens of Bleeker's collection in the Leiden Museum seen by us).

Habitat: Java (Batavia!); Borneo (Sandakan); North Celebes; Ambon!; New Guinea. — From Japan, China, Formosa, Philippines, to Cape York, Fiji Islands, New Caledonia, Caroline and Tonga Islands. — Also recorded from Mauritius by Lunel Mém. Soc. Phys. Hist. Nat. 1881, p. 270, but this may be a mistake.

In sea.

Note: There exists still some confusion about this species. It was first described from Japan by Schlegel, who says about the lateral teeth: "les molaires sont coniques, peu larges et distribuées sur une seule rangée". One of us had the opportunity to examine the typical specimens in the Leiden Museum and found the lateral teeth to be conical. He also could state that there are 4½ rows of scales between the lateral line and the middle dorsal spines.

Now Günther described (Cat. Brit. Mus. I. 1859, p. 464) a fish as *L. haematopterus* from Japan, with "rounded molars, with a very indistinct impression on the crown" and with 6 rows of scales above the lateral line. As Bleeker pointed out this must be another species, which he called *L. Güntheri*. This species has afterwards been associated with *Sparus choerorhynchus* Bl. Schn. by Jordan & Thompson (l.s.c. p. 562).

Günther also described (l.s.c.) *L. richardsoni* from China, on specimens which Richardson (l.s.c.) had called *L. haematopterus*. This species has "all the teeth of the lateral series conical, not molar-like" and 5 scales above the lateral line. It is therefore much nearer the real *haematopterus* than what Günther mentions under that name. Bleeker (Atl. Ichth. VIII, p. 113) was of opinion, that it could not be united with *haematopterus*: "Sa physionomie, à en juger d'après la figure, est encore assez différente et en outre il a les lobes de la caudale beaucoup plus obtus". The colour is also different and Bleeker lays stress on a black roundish blotch between the lateral line and the pectoral fin, which he does not find in *L. haematopterus*.

Kner (l.s.c.) puts *richardsoni* with a querry in the synonymy of *haematopterus*. Later on Klunzinger gave a short diagnosis, in which he says: "Zähne konisch, die hinteren ebenso, wenn auch stumpfer".

We do not think, that Bleeker's arguments for separating *haematopterus* and *richardsoni* are sound. The specimen is stuffed, so not much stress can be laid on the "physionomie" from the drawing or on the coloration. We think they can be united, as has been done by Jordan & Thompson (l.s.c.).

Recently both species have again been separated by Herre & Montalban (l.s.c.). *L. richardsoni* (p. 405) is described as having conical lateral teeth and 6 rows of scales between lateral line and origin of dorsal and *L. haematopterus* as having "anterior teeth of lateral series conical, becoming molars posteriorly" and with 5 scales between lateral line and origin of dorsal. It is evident, that they made the same mistake as Günther did, their *richardsoni* being *haematopterus*, and their *haematopterus* being another species. It is however questionable if this is *choerorhynchus*, for they state expressively that there are 5 rows of scales between lateral line and dorsal, whereas *choerorhynchus* has 6. Now it is true, as Klunzinger has already remarked that these rows of scales have to be counted between median spines of dorsal and lateral line and not below origin of dorsal, then, even in species which have 5 in the former way of counting, there are often 6 between Ll. and origin of dorsal. We therefore do not lay stress on the statement of Herre & Montalban, that there are 6 scales between Ll. and origin of dorsal in their *richardsoni* (= *haematopterus*). When they count however only 5 scales between origin of D. and Ll. in their *haematopterus,* it is almost impossible that there will be 6 rows between middle dorsal spines and Ll. We think it probable, that their *haematopterus* is identical with *L. mahsena.*

7. **Lethrinus hypselopterus** Blkr.

Lethrinus hypselopterus Bleeker, Ned. Tijdschr. Dierk. IV, 1873, p. 326. — Atl. Ichth. VIII, 1877, p. 114.
Lethrinus hypselopterus Evermann & Seale, Bull. Bur. Fish. XXVI (1906), 1907, p. 86.
Lethrinus mahsena M. Weber, Siboga Exp. Fische. 1913, p. 289 (nec Forsk.).
Lethrinus hypselopterus Herre & Montalban, Philipp. Journ. of Science XXXIII, 1927, p. 419.
Lethrinus hypselopterus Fowler, Bull. U. S. Nat. Mus. Vol. XII, 1933, p. 14.

D. X. 9. A .III. 8. P. 1. 12. V. I. 5. Ll. 45—46. Ltr. $\begin{array}{c} 4\frac{1}{2}\text{—}5 \\ \hline 1 \\ \hline 16 \end{array}$.

Height 2.3—2.5, 2.8—3.1 in length with caudal. Head 2.6—2.8, 3.2—3.6 in length with caudal. Eye 3.6—4. Interorbital space somewhat convex, about equal to eye. Profile before eye slightly concave. Relative length of sides of triangle formed by middle of pupil, angle of preoperculum and snout (in this sequence) 1 : 1.3—1.4 : 1.3. Mouth slightly oblique, jaws subequal. Corner of mouth in vertical between anterior and posterior nostril. Canines rather strong, somewhat curved. Posterior lateral teeth molarlike, rounded. Origin of dorsal separated by 5 rows of scales from lateral line. Dorsal spines moderately strong, heteracanth, the third and fourth longest, equal to distance between hindborder of eye and anterior or posterior nostril, less than longest soft dorsal rays. Origin of anal separated by 15 scales from lateral line, below last dorsal spine. Second anal spine slightly stronger than third, somewhat shorter than longest dorsal spine, shorter than longest soft anal rays, which are longer than base of soft part of anal. Pectorals pointed, almost as long as head, ventrals somewhat shorter. Caudal moderately incised, the lobes rounded. Least height of caudal peduncle 1.2—1.3 in its length. Colour of alcohol specimens brownish above, whitish below, many scales having a darker border and giving a reticulate appearance to sides. Sometimes there are indications of darker crossbands, formed by the dark margin of the scales on lower part of body. Head brownish violet, interorbital part much darker. Median part of soft dorsal and anal rays as well as of caudal rays and some of the dorsal spines violet, suggesting a median dark band, longitudinal on dorsal and anal and transverse on caudal. Pectorals yellowish, ventrals more or less violet, excepting the base. Length 508 mm. (Specimens of *L. hypselopterus* of Bleeker's collection in the Leiden Museum seen by us).

Nomen indig.: Mata-hari (Malay), Ling-tjam (Chinese, Batavia).

Habitat: Singapore; Sumatra (Benkulen); Java (Batavia); Saleyer!; Borneo; Celebes (Strait Lembe, North of Malibagu Point); Obi-major; Gomomo Island; Pitt Passage; Buru; Solor; Damar!; Samau!; Waigeu. — Philippines, Solomon Islands.

In sea.

Note: This species has been united by Jordan & Seale (Bull. Bur. Fish. XXV (1905) 1906, p. 270) and by one of us with L. *mahsena*. Comparision of typical *mahsena* from the Red Sea has convinced us, that they have to remain separate, *hypselopterus* being distinguished by its much higher anal fin.

8. **Lethrinus mahsena** (Forsk.)

Sciaena mahsena Forskål, Descr. Animalium. 1775, p. 52.
Lethrinus bungus Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 279.
Lethrinus abbreviatus Cuvier & Valenciennes, ibid. p. 312.
Lethrinus mahsena Cuvier & Valenciennes, ibid. p. 313.
Lethrinus mahsena Rüppell, Neue Wirbelth. Fische. 1835, p. 119.
Lethrinus mahsena Günther, Cat. Brit. Mus. I. 1859, p. 463.
Lethrinus mahsena Kner, Novara Exp. I. Fische. 1865, p. 270.
Lethrinus mahsena Klunzinger, Verhandl. zool. bot. Gesellsch. Wien. XX, 1870, p. 753. Fische des rothen Meeres. I, 1884, p. 40.
Lethrinus mahsena Günther, Fische der Südsee I, 1873—1875, p. 65.
Lethrinus mahsena Kossmann & Räuber, Verh. Naturh. Med. Vereins Heidelberg I, 1876, p. 17.
Lethrinus mahsena Sauvage, Poissons de Madagascar. 1891, p. 205.
Lethrinus mahsena Herre & Montalban, Philipp. Journ. of Science. XXXIII, 1927, p. 417.
Lethrinus haematopterus Fowler, Bull. U. S. Nat. Mus. Vol. XII. 1933, p. 43 (nec Schl.).
Lethrinus mahsena Fowler, ibid. p. 53.

D. X. 9. A. III. 8. P. 1. 12. V. I. 5. Ll. 48. Ltr. $\begin{array}{c} 4\frac{1}{2}—5 \\ \hline 1 \\ \hline 15 \end{array}$.

Dorsal profile arched and somewhat keeled on nape. Height 2.5—2.8, 3—3.4 in length with caudal. Head 2.8—2.9, 3.5—3.6 in length with caudal. Eye 3.5—4.4, equal to somewhat convex interorbital space and 1.8—2 in snout. Mouth slightly oblique, jaws subequal. Maxillary reaching to vertical between anterior and posterior nostril. Canines strong, curved; anterior lateral teeth pointed, posterior ones flat molars. Dorsal spines moderate, fourth and fifth longest, equal to distance between hindborder of eye and anterior nostril, equal to longest soft dorsal rays. Origin of anal above last dorsal spine, separated by 15 scales from lateral line. Third anal spine somewhat longer than second, which is as long as eye. Longest soft anal rays equal to third anal spine in length, much less than length of base of soft part of anal. Pectorals pointed, about one half eyediameter less than length of head. Ventrals much shorter, somewhat more than snout and eye. Caudal moderately incised. Least height of caudal peduncle 1.5 in its length. Colour of alcohol specimens silvery, each scale with a brown hindborder. Fins smoky brown. Length 400 mm. (Description made after a specimen of 216 mm from the Red Sea).

Habitat: Celebes (Kait Point, Libani Bay); Buru; Tomahu Island; Mysore. — From eastcoast of Africa, Red Sea, Ceylon, Philippines, Pacific Islands eastwards to Paumotu Islands.

Note: This species is apparently rare in the Indo-australian Archipelago. Bleeker never saw a specimen from this region.

9. **Lethrinus miniatus** ((Forster) Bl. Schn.). (Fig. 89, p. 446)

Sparus miniatus (Forster) Bloch Schneider, Systema Ichth. 1801, p. 281.
Lethrinus rostratus Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 296.
Lethrinus olivaceus Cuvier & Valenciennes, ibid. p. 295.
Lethrinus waigiensis Cuvier & Valenciennes, ibid. p. 297.
Lethrinus miniatus Cuvier & Valenciennes, ibid. p. 315.
Lethrinus rostratus Günther, Cat. Brit. Mus. I, 1859, p. 454.
Lethrinus rostratus Bleeker, Verh. Bat. Gen. XXIII (1849), 1850, Sparid. p. 13. Ned. Tijdschr. Dierk. IV (1872), 1873, p. 343.
Lethrinus longirostris Playfair & Günther, Fishes of Zanzibar. 1866, p. 44.
Lethrinus miniatus Günther, Fische der Südsee I, 1873, p. 63.
Lethrinus miniatus Bleeker, Atl. Ichth. VIII, 1876—1877, p. 121.
Lethrinus miniatus Klunzinger, Fische des rothen Meeres I, 1884, p. 38.
Lethrinus olivaceus Sauvage, Poissons de Madagascar 1891, p. 198.
Lethrinus waigiensis Sauvage, ibid. p. 199.
Lethrinus (Lethrinella) miniatus Fowler, Journ. Acad. Nat. Science Philadel. (2) XII, prt. 4, 1904, p. 529.
Lethrinella miniata Jordan & Seale, Bull. Bur. Fish. XXV (1905) 1906, p. 270.
Lethrinus miniatus Steindachner, Sitzber. Akad. Wien CXV, Abt. 1, 1906, p. 1385.
Lethrinus miniatus Barnard, Ann. S. Afric. Mus. XXI, 1925—1927, p. 632 (sine syn.).

Lethrinus miniatus Herre & Montalban, Philipp. Journ. of Science XXXIII, 1927, p. 402.

Lethrinus miniatus Fowler, Bull. U. S. Nat. Mus. Vol. XII, 1933. p. 8 (sine syn.).

D. X. 9. A. III. 8. P. 1. 12. V. I. 5. Ll. 48—49. Ltr. $\begin{array}{c} 5-5\frac{1}{2} \\ \hline 1 \\ \hline 17-19 \end{array}$.

Height 2.8—3.2, 3.5—3.9 in length with caudal. Head 2.5—2.8, 3—3.3 in length with caudal. Eye 3.7—6.2. Interorbital space flat or slightly concave, somewhat less than eye in young specimens, more than eye in large ones. Relative length of sides of triangle, formed by middle of pupil, angle of preoperculum and snout (in this sequence) 1 : 2 : 1.6. Mouth almost horizontal, its corner before anterior nostril. Lips thick. Canines moderate, slightly curved; lateral teeth small, pointed, even in large specimens. Six to six and a half rows of scales between origin of dorsal and lateral line. Dorsal spines slender, third to fifth longest, equal to or somewhat longer than postorbital part of head. Longest soft dorsal rays half diameter of eye longer. Origin of anal separated by 16 scales from lateral line, below last dorsal spine. Second anal spine thicker and somewhat shorter than third one, which equals eye or is half diameter of eye longer and which is somewhat shorter than soft anal rays. Ventrals pointed, scarcely shorter than pectorals, which equal snout in length. Caudal incised, the lobes pointed. Least height of caudal peduncle twice in its length. Colour of alcohol specimens brownish above, silvery below. A blackish spot, about 4 scales high and 5 scales long, below lateral line and above middle of pectoral. Body with more or less distinct incomplete blackish crossbands, not always conspicuous. Three dark brown straight stripes from front-border of eye to maxillary. Preoperculum and operculum with

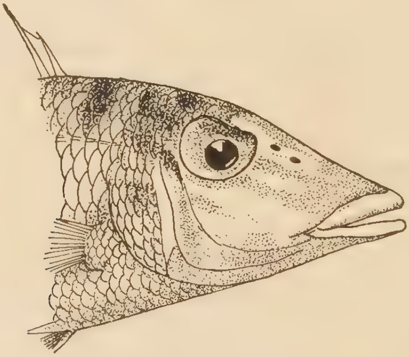

Fig. 89. *Lethrinus miniatus* (Bl. Schn.) n.s.

similar stripes or blotches. Vertical fins with more or less conspicuous dark bands. Pectorals yellowish, ventrals leaden-colour, darker towards the end. Length 820 mm. (Probable type of *L. rostratus* in the Leiden Museum and types of *L. olivaceus* and *L. waigiensis* in the Paris Museum seen by us).

Habitat: Pulu Weh!; Sumatra (Padang); Nias!; Java (Anjer!, Batavia!, Bantam, Semarang); Borneo (Sandakan); Bali; Celebes (Makassar!, Badjoa, Menado, Strait Lembe), Tomahu Island; Gomomo Island; Batjan; Ambon!; Banda; Timor; Waigeu!; New Guinea!. — From the coast of Natal, Madagascar, Seychelles, Mozambique, Red Sea, coasts of British India to Japan, Philippines and eastwards to Paumotu Islands.

In sea.

Note: Bleeker supposed that *L. olivaceus* and *L. waigiensis* belong to *L. miniatus*, but Sauvage (l.c.) who examined the typical specimens, thought that Bleeker was wrong. One of us had the opportunity to study the types again. There are two specimens in the Paris Museum in one bottle, labelled "*Lethrinus waigiensis*, Waigiou, Quoy & Gaimard". The largest specimen, which is certainly the one described by Cuvier & Valenciennes, is identical with *L. miniatus*, the smaller one is the same as *L. reticulatus*. The type of *L. olivaceus* is without doubt a specimen of *L. miniatus* and Bleeker was therefore right in considering both species to be synonyms of *L. miniatus*. Barnard (l.s.c.) unites *miniatus* and *variegatus*, being of opinion, that the character of one scale more above the lateral line of the former is not distinctive. We can not agree with this author. We found the number of scales above the lateral line, if counted below the median dorsal spines and not below the first spine, to be very constant in all species of *Lethrinus*.

10. **Lethrinus ornatus** C.V. (Fig. 90, p. 448)

Lethrinus ornatus Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 310.
Lethrinus mahsenoides? Bleeker, Verh. Bat. Gen. XXIII (1849), 1850, Sparid. p. 15.
Lethrinus xanthotaenia Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 176.
Lethrinus mahsenoides Günther, Cat. Brit. Mus. I, 1859, p. 464.
Lethrinus insulindicus Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 334.
Lethrinus ornatus Bleeker, ibid. p. 335.
Lethrinus ornatus Day, Fishes of India 1875—1888, p. 137 (partim).
Lethrinus insulindicus Bleeker, Atl. Ichth. VIII, 1877, p. 117.
Lethrinus ornatus Bleeker, ibid. p. 118.
Lethrinus ornatus Macleay, Proc. Linn. Soc. N. S. Wales. VII. 1882, p. 247.
Lethrinus aurolineatus Macleay, l.c.

Lethrinus ornatus De Vis, ibid. IX, 1884, p. 458.
Lethrinus mahsenoides Ramsay & Ogilby, ibid. (2) I, 1886, p. 8.
Lethrinus mahsenoides Steindachner, Abh. Senckenb. naturf. Gesellsch. XXV, 1900, p. 418.
Lethrinus mahsenoides Evermann & Seale, Proc. U. S. Nat. Mus. XXXI, 1907, p. 508.
? *Lethrinus mahsenoides* Jordan & Seale, Bull. Bureau Fish. XXVI (1906), 1907, p. 24.
? *Lethrinus mahsenoides* Jordan & Richardson, ibid. XXVII, 1908, p. 259.
Lethrinus mahsenoides Seale & Bean, Proc. U. S. Nat. Mus. XXXIII. 1908, p. 244.
Lethrinus xanthotaenia Seale & Bean, l.c.
Lethrinus insulindicus Jordan & Richardson, Mem. Carnegie Mus. IV, No. 4, 1909, p. 189.
Lethrinus ornatus Herre & Montalban, Philipp. Journ. of Science XXXIII, 1927, p. 422.
Lethrinus insulindicus Herre & Montalban, ibid. p. 424.
Lethrinus erythrurus Fowler, Bull. U. S. Nat. Mus. Vol. XII. 1933, p. 49 (nec C.V.?).

D. X. 9—10. A. III. 8. P. 1. 12. V. I. 5. Ll. 47. Ltr. $\frac{\frac{5-5\frac{1}{2}}{1}}{15}$.

Height 2.4—2.8, 2.9—3.5 in length with caudal. Head 2.9—3.1, 3.8 in length with caudal. Eye 3—3.5. Interorbital space slightly convex, less than or equal to eye. Relative length of sides of triangle, formed by middle of pupil, angle of preoperculum and snout (in this sequence) 1 : 1.3—1.5 : 1—1.2. Mouth slightly oblique, jaws subequal. Corner of mouth in vertical between anterior and posterior nostril. Canines moderate. Lateral teeth

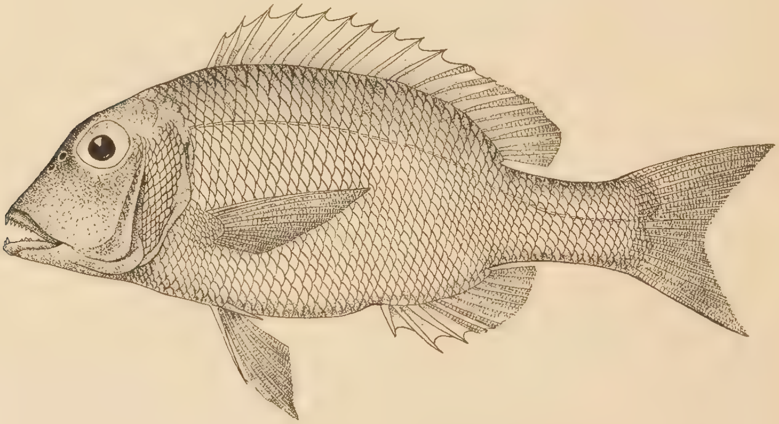

Fig. 90. *Lethrinus ornatus* C.V. × ½.

rounded and molarlike. Origin of dorsal separated by 6 scales from lateral line. Dorsal spines slender, third or fourth longest, equal to postorbital part of head and half eye and about as long as longest soft dorsal rays. Origin of anal slightly behind vertical through last dorsal spine, separated by 14 scales from lateral line. Second anal spine much thicker than third, but about of the same length, longer than eye and slightly more than soft anal rays. Pectorals long and pointed, almost as long as head; ventrals equal to snout and eye. Caudal incised, the lobes pointed. Least height of caudal peduncle 1.5 in its length. Colour of alcohol specimens yellowish brown, somewhat lighter below, with traces of longitudinal bands, which are reddish in life. Fins hyaline, pectorals often with a dark axil. Length 450 mm. (A specimen of *L. ornatus* of Bleeker's collection in the Amsterdam Museum seen by us).

Nomen indig.: Mata-Hari (Malay, Batavia), Ling-tjam (Chinese, Batavia).

Habitat: Sumatra (Siboga, Padang, Benkulen); Java (Batavia); Duizend Islands!; Borneo (Sandakan); Bali; Celebes (Macassar!, Bonthain, Badjoa, Menado); Flores; Timor; Batjan; Ternate; Ceram!; Ambon!; Banda; Goram; Aru Islands; New Guinea (Manokwari and southeast coast). — Bourbon, Andamans, Philippines, Formosa, Queensland, Tonga.
In sea.

We have united *L. insulindicus* with this species. The only difference seems to be, that *ornatus* has longitudinal bands and that *insulindicus* is uniform. Lastnamed has according to Bleeker somewhat greater depth, but the difference is too slight to separate them.
This species is hardly separable from *L. mahsenoides* (Ehrb.) C.V. We examined some specimens from the Red Sea; they are slightly more elongate, as has been mentioned by Klunzinger (Fische des rothen Meeres I, p. 39) but agree in all other respects. Bleeker's statement, that *mahsenoides* has only 4½—5 scales between D. and Ll. is erroneous, as Klunzinger (l.c.) has already pointed out. We suppose that *L. aurolineatus* Macleay (l.s.c.) belongs to this species. The description is too incomplete to give a certain opinion. The interorbital space is said to be nearly two eyediameters, but as his longest specimen was 18 inch (450 mm), this difference may be due to age.

11. **Lethrinus rhodopterus** Blkr.

? *Lethrinus erythrurus* Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 293.
Lethrinus Harak Bleeker, Verh. Bat. Gen. XXIII (1849), 1850. Sparid. p. 15 (nec Forsk.).
Lethrinus rhodopterus Bleeker, Nat. Tijdschr. Ned. Indië III (1851), 1852, p. 65.
? *Lethrinus amboinensis* Kner, Novara Exp. Fische. I, 1865, p. 80 (nec Blkr.).
Lethrinus harak? Kner, ibid. p. 81 (nec Forsk.).
Lethrinus bonhamensis Günther, Fische der Südsee I, 1873, p. 65.
Lethrinus harak Day, Fishes of India 1875—1888, p. 137 (nec Forsk.).
Lethrinus harak Bleeker, Atl. Ichth. VIII, 1876—1877, p. 119 (nec Forsk.).
Lethrinus papuensis Alleyne & Macleay, Proc. Linn. Soc. N. S. Wales I, 1877, p. 276.
Lethrinus Bleekeri Klunzinger, Fische des rothen Meeres 1884, p. 41.
Lethrinus harak Steindachner, Sitzber. Akad. Wien. CXV Abt. 1, 1906, p. 1385 (nec Forsk.).
Lethrinus harak Jordan & Seale, Bull. Bur. Fish. XXV (1905), 1906, p. 270 (nec Forsk.).
Lethrinus bonhamensis Jordan & Seale, l.c.
Lethrinus harak Seale & Bean, Proc. U. S. Nat. Mus. XXXIII, 1908, p. 244 (nec Forsk.).
Lethrinus harak Snyder, ibid. XLII, 1912, p. 500 (nec Forsk.).
Lethrinus harak Ogilby, Mem. Queensland Mus. II, 1913, p. 90 (nec Forsk.).
Lethrinus Bleekeri M. Weber, Siboga Exp. Fische 1913, p. 287.
Lethrinus opercularis de Beaufort, Bijdrage tot de Dierkunde, Afl. XIX, 1913, p. 123 (nec C.V.).
Lethrinus harak Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, p. 40 (nec Forsk.).
Lethrinus harak Mc Culloch, Check List of the fish of N. S. Wales II, Austral. Nat. II, 1922, p. 87 (nec Forsk.).
Lethrinus harak Herre & Montalban, Philipp. Journ. of Science XXXIII, 1927, p. 413.
Lethrinus harak Fowler, Bull. U. S. Nat. Mus. Vol. XII. 1933, p. 21 (nec Forsk.).

D. X. 9. A. III. 8. P. 1. 12. V. I. 5. Ll. 47—48. Ltr. $\begin{array}{c}5—5\frac{1}{2}\\ \hline 1\\ \hline 15—16\end{array}$.

Height 2.7—2.8, 3.3—3.5 in length with caudal. Head 2.7—3.1, 3.3—3.9 in length with caudal, its height equal to its length. Eye 3—3.6, twice in snout. Interorbital space slightly convex, equal to or somewhat less than eye. Relative length of sides of triangle, formed by middle of pupil, angle of preoperculum and snout (in this sequence) 1 : 1.4—1.5 : 1.2. Mouth very slightly oblique, jaws equal. Corner of mouth in vertical between anterior and posterior nostril. Canines moderate, posterior lateral teeth molarlike, rounded. Six to six and a half rows of scales between origin of dorsal and lateral line. Dorsal spines slender, the fourth longest, slightly longer than third one and about half length of pupil longer than eye, slightly less than longest soft dorsal rays. Origin of anal separated by 14 scales from lateral line, below last dorsal spine. Second anal spine stronger than third, which is longer and about equal to eye; soft anal rays slightly longer. Pectorals long and pointed, almost as long as head. Ventrals equal to half eye and snout together. Caudal incised, the lobes pointed. Least height of caudal peduncle 1.5 in its length. Colour of alcohol specimens brownish above, silvery below. Head more or less violet, darker than body. A large black patch between lateral line and posterior part of pectoral. Fins yellowish. Length 418 mm.

Nomen indig.: Mata-Hari (Malay, Batavia), Ling-Tjam (Chinese, Batavia).

Habitat: Pulu Weh!; Singapore; Sumatra (Benkulen, Padang); Nias!; Java (Batavia!, Japara); Bawean; Borneo (Sandakan); Celebes (Kait Point, Libani Bay); Spermonde Archipelago; Buton!; Tanakeke Island; Obi-major; Gomomo Island, Pitt Passage; Halmahera; Nusa Laut!; Ambon!; Buru; Banda; Solor; Ceram!; Ternate; Waigeu!; New Guinea. — British India, Andamans, Bonham Island, Riu-Kiu Islands, Philippines, eastwards to Queensland, Samoa and Tonga.

In sea.

Note: Klunzinger (l.s.c.) has shown, that *L. harak* (Forsk.) from the Red Sea differs from *L. harak* Blkr. by having one scale less between middle dorsal spines and lateral line. He proposed the name *Bleekeri* for Bleeker's species, but as Bleeker described his *harak* formerly as *L. rhodopterus,* which later on he considered to be a synonym of *harak,* the name *rhodopterus* has priority.

We examined a large specimen of *L. bonhamensis* Gthr. from Tonga in the Leiden Museum. It is slightly more elongate than a specimen of *L. rhodopterus* of equal length from the Indo-australian Archipelago, but otherwise agrees completely with it.

12. **Lethrinus leutjanus** (Lac.) Blkr.

? *Bodianus leutjanus* Lacépède, Hist. Nat. Poissons IV, 1802, p. 281.
? *Lethrinus sordidus* Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 298.
? *Lethrinus leutjanus* Cuvier & Valenciennes, ibid. p. 309.
Lethrinus leutjanus Bleeker, Verh. Bat. Gen. XXIII (1849), 1850, Spar. p. 14.
Lethrinus cocosensis Bleeker, Nat. Tijdschr. Ned. Indië VII, 1854, p. 40.

Lethrinus leutjanus Günther, Cat. Brit. Mus. I, 1859, p. 461.
? *Lethrinus fasciatus* Kner, Novara Exp. Fische. I, 1865, p. 82 (nec C.V.).
Lethrinus leutjanus Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 340. — Atl. Ichth. VIII, 1877, p. 120.
Lethrinus cocosensis Bleeker, ibid. p. 341. Ibid. p. 121.
Lethrinus opercularis Day, Fishes of India 1875—1888, p. 136 (nec Blkr.).
? *Lethrinus cocosensis* Macleay, Descr. Cat. Austr. Fish. I, 1881, p. 114.
Lethrinus nebulosus Day, Fauna of British India, Fishes II, 1889, p. 39 (nec Forsk.).
Lethrinus leutjanus Pellegrin, Bull. Mus. Hist. Nat. IV, 1898, p. 229.
Lethrinus leutjanus Jordan & Evermann, Proc. U. S. Nat. Mus. XXV, 1902, p. 350.
Lethrinus cutambi Seale, Philipp. Journ. of Science IV, 1909, p. 514.
Lethrinus cutambi Herre & Montalban, ibid. XXXIII, 1927, p. 407.
Lethrinus leutjanus Herre & Montalban, ibid. p. 421.
Lethrinus leutjanus Fowler, Bull. U. S. Nat. Mus. Vol. XII. 1933, p. 57.

D. X. 9. A. III. 8. P. 1. 12. V. I. 5. Ll. 47—48. Ltr. $\frac{5-5\frac{1}{2}}{\frac{1}{15}}$.

Dorsal profile gently curved from snout to dorsal. Height 2.7—2.8, 3.3—3.4 in length with caudal. Head 2.9—3, 3.5—3.7 in length with caudal. Eye 3.9—4.2, equal to or somewhat more than slightly convex interorbital space and 1.9—2 in snout. Mouth slightly oblique, maxillary reaching to below vertical between nostrils. Relative length of sides of triangle, formed by middle of pupil, angle of preoperculum and snout (in this sequence) 1 : 1.4 : 1.2. Canines moderate, posterior lateral teeth strong molars. Fourth or fourth and fifth dorsal spines longest, equal to postorbital part of head and one third of eye, less than longest soft dorsal rays. Origin of anal below last dorsal spine, separated by 14 scales from lateral line. Third anal spine longest, somewhat longer than eye, about as long as soft anal rays. Pectorals as long as or somewhat longer than snout and eye, ventrals half eyediameter shorter. Caudal moderately incised, the lobes pointed. Least height of caudal peduncle twice in its length. Colour of alcohol specimens uniform, pearly white spots on scales of back may be present. In life with transverse dark bands on body and tail. Length 318 mm. (Specimens of *L. leutjanus* and *L. cocosensis* of Bleeker's collection in the Leiden Museum seen by us).

Nomen indig.: Mata-Hari (Malay, Batavia), Ling-Tjam (Chinese, Batavia).

Habitat: Sumatra (Siboga); Java (Batavia!); Kangean!; Bawean!; Borneo (Sandakan); Birabirahan Island; Muna!; Celebes (Macassar!, Menado, Kait Point, Libani Bay); Sulu Islands; Ambon; Halmahera; Tomahu Islands; Gomogomo Island, Pitt Passage; New Guinea. — Aden!, British India, Philippines, Formosa, Cocos Islands, New Holland?, eastwards to Samoa.

In sea.

Note: We consider *L. leutjanus* and *L. cocosensis* to be synonyms, after having examined specimens of Bleeker's collection. There is no difference in the height of the dorsal spines and the presence or absence of bands is of no value in separating species of *Lethrinus*.

13. **Lethrinus nebulosus** (Forsk.) (Fig. 84, p. 430)

Sciaena nebulosa Forskål, Descr. Animalium. 1775, p. 52.
Lethrinus nebulosus Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 284.
Lethrinus Gothofredi Cuvier & Valenciennes, ibid. p. 286.
Lethrinus opercularis Cuvier & Valenciennes, ibid. p. 289.
Lethrinus centurio Cuvier & Valenciennes, ibid. p. 301.
Lethrinus esculentus Cuvier & Valenciennes, ibid. Tab. 158.
? *Lethrinus karwa*, Cuvier & Valenciennes, ibid. p. 311.
Lethrinus opercularis Bleeker, Verh. Bat. Gen. XXIII (1849), 1850, Sparid. p. 14.
? *Pentapaodus nubilis* Cantor, Journ. Asiat. Soc. Bengal 1850, p. 49.
Lethrinus centurio Peters, Monatsber. Akad. Berlin. 1855, p. 435.
Lethrinus Gothofredi Peters, l.c.
Lethrinus nebulosus Günther, Cat. Brit. Mus. I, 1859, p. 460.
Lethrinus karwa Day, Proc. Zool. Soc. London 1867, p. 558. — Fishes of India 1875—1888, p. 135.
Lethrinus nebulosus Klunzinger, Verh. zool. bot. Ges. Wien. XX. 1870, p. 754.
Lethrinus opercularis Bleeker, Ned. Tijdschr. Dierk. IV (1872), 1873, p. 327.
Lethrinus nebulosus Kossmann & Raüber, Verh. Naturh. Med. Vereins Heidelberg I, 1876, p. 17.
Lethrinus nebulosus var. *Chumchum*, Kossmann & Raüber, l.c.
Lethrinus nebulosus var. *ochrolineata* Kossmann & Raüber, ibid. p. 18.
Lethrinus opercularis Bleeker, Atl. Ichth. VIII, 1877, p. 119.
Lethrinus nebulosus Klunzinger, Fische des rothen Meeres I, 1884, p. 40.
Lethrinus nebulosus Macleay, Proc. Lin. Soc. N. S. Wales IX, 1884, p. 16.
Lethrinus karwa Day, Fauna of British India, Fishes II, 1889, p. 38.
Lethrinus centurio Sauvage, Poissons de Madagascar 1891, p. 203.
Lethrinus nebulosus Pfeffer, Jahrb. d. Hamb. wisschenschaftl. Anst. X, 1893, p. 9.
Lethrinus karwa Thurston, Madras Govern. Mus. Bull. 3, 1895, p. 135.
Lethrinus nebulosus Steindachner, Abhandl. Senckenb. naturf. Ges. XXV, 1900, p. 418. — Denksch. Akad. Wien LXXI, 1902, p. 133.
Lethrinus nebulosus Pellegrin, Bull. Soc. Zool. France XIII, 1905, p. 84. — Bull. Mus. Hist. Nat. Paris XIII, 1907, p. 203.
Lethrinus centurio Pellegrin, l.c.
Lethrinus scoparius Gilchrist & Thompson, Ann. South Afric. Mus. VI, 1908, p. 168.
Lethrinus carinatus M. Weber, Siboga Exp. Fische. 1913, p. 289.

Lethrinus opercularius M. Weber, ibid. p. 291.
Lethrinus centurio Pellegrin, Bull. Soc. Zool. France XXXIX, No. 5, 1914, p. 226.
Lethrinus nebulosus Ogilby, Mem. Queensl. Mus. V, 1916, p. 163.
Lethrinus opercularis McCulloch, Checklist of the fish of N. S. Wales III, Austr. Zool. II, Prt. III, 1922, p. 87.
Lethrinus nebulosus Barnard, Ann. S. Afric. Mus. XXI, 1925—1927, p. 633.
Lethrinus opercularis Herre & Montalbàn, Philipp. Journ. of Science XXXIII, 1927, p. 420.
Lethrinus nebulosus Fowler, Mem. Bishop Mus. X. 1928, p. 215. — Journ. Bombay Nat. Hist. XXXIII. 1929, p. 113.
Lethrinus nebulosus Borodin, Vanderbilt marine Mus. I. art. 3. 1932, p. 83.
Lethrinus nebulosus Fowler, Bull. U. S. Nat. Mus. Vol. XII, 1933, p. 33.
Lethrinus carinatus Fowler, ibid. p. 52.

D. X. 9. A. III. 8. P. 1. 12. V. I. 5. Ll. 48. Ltr. $\begin{array}{c}5-5\frac{1}{2}\\ \hline 1\\ \hline 15-16\end{array}$.

Height 2.5—2.6, 3—3.1 in length with caudal. Head 2.8—3.1, 3.4—3.7 in length with caudal. Eye 3.4—4.1, 1.8—1.9 in snout. Interorbital space equal to or somewhat more or less than eye, slightly convex in young specimens, more so and more or less keeled in large specimens. Relative length of sides of triangle, formed by middle of pupil, angle of preoperculum and snout (in this sequence) 1 : 1.4—1.6 : 1.2—1.3. Mouth very slightly oblique, jaws equal. Corner of mouth below anterior nostril. Canines rather small, slightly curved. Lateral teeth, especially the posterior ones rounded and molarlike, often broader than long. Six to six and a half rows of scales between origin of dorsal and lateral line. Dorsal spines slender, heteracanth, the third one longest, somewhat more than postorbital part of head and less than longest soft dorsal rays. Origin of anal separated by 14 scales from lateral line, below last dorsal spine. Second and third anal spines subequal, about as long as eye and somewhat less than longest soft anal rays. Pectorals long and pointed, almost as long as head; ventrals equal to half eye and snout together. Caudal incised, the lobes more or less pointed. Least height of caudal peduncle 1.5 in its length. Colour of alcohol specimens brownish above, silvery below, head often violet above, operculum silvery with a narrow yellowish hindborder (red in life). Some or all scales of body with pearly-white spots. Dorsal with traces of oblique longitudinal stripes, caudal with traces of crossbars. Pectorals and ventrals yellowish. Lengh 490 mm.

Nomen indig.: Mata-Hari, Leutjan (Malay, Batavia), Ling-Tjam (Chinese, Batavia).

Habitat: Pulu Weh!; Singapore; Sumatra (Siboga, Padang, Benkulen); Nias!; Bintang; Banka; Biliton; Java (Batavia!, Bantam, Semarang); Duizend Islands!; Bawean; Madura; Borneo (Sandakan); Bali; Celebes (Macassar!; Badjoa, Menado); Sangir Islands; Saleyer!; Flores!; Timor; Kei Islands!; Halmahera; Batjan; Obi; Gomomo Island, Pitt Passage, Ceram!; Buru!; Ambon; New Guinea (Seget!). — Coast of Natal and Zululand, Madagascar, Seychelles, Mossambique, Red Sea, coast of Arabia and British India, Tonkin, China, Philippines, coast of Queensland and New South Wales, Abrolhos Islands, Lord Howe Island, New Caledonia, Fiji Island.

In sea.

Note: This species is very common in the Indo-australian Archipelago and has a very wide range in the Indic. The dorsal profile varies much, in some specimens it is much elevated and the nape is keeled. Such specimens have been considered by Cuvier & Valenciennes (*L. Gothofredi*) and by one of us (*L. carinatus*) as distinct species, but since we could examine a large material not only from the Indo-australian Archipelago, but also from the Red Sea, we are convinced that they can not be separated as has already been pointed out by Rüppell (Verzeichnis Sammlung Museum Senckenberg. naturf. Ges. Frankfort 1852, p. 7) and Klunzinger. We also agree with Pfeffer, Klunzinger, Barnard and others that *L. nebulosus* and *L. opercularis* are but one species. *L. centurio* belongs also to the synonymy. Although Sauvage (l.s.c.) describes the posterior teeth of the type as: "petites et légèrement subulées", the figure of Cuvier & Valenciennes leaves no doubt that they are molars. Young specimens are hardly distinguishable from *L. leutjanus*.

14. **Lethrinus ramak** (Forsk.)

Sciaena ramak Forskål, Descr. Animalium 1775, p. 52.
Sparus ramak Lacépède, Hist. Nat. Poissons IV, 1802, p. 34.
Lethrinus flavescens Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 299.
Lethrinus ehrenbergi Cuvier & Valenciennes, ibid. p. 312.
Lethrinus ramak Rüppell, Neue Wirbelthiere 1837, p. 117.
Lethrinus ramak Günther, Cat. Brit. Mus. I, 1859, p. 459.
Lethrinus ramak Day, Fishes of India 1875—1888, p. 137.
Lethrinus ramak Günther, Fische der Südsee I, 1873—1875, p. 64.
Lethrinus ramak Waite, Mem. Austr. Mus. III, 1899, p. 185.
Lethrinus ramak Fowler, Bull. U. S. Nat. Mus. Vol. XII. 1933, p. 47.

D. X. 9. A. III. 8. P. 1. 12. V. I. 5. Ll. 48. Ltr. $\begin{array}{c}5\frac{1}{2}\\\hline 1\\\hline 16\end{array}$.

Dorsal profile moderately elevated, sloping down in a gentle curve from origin of anal to snout. Height equal to head, 2.8 in length, 3.4 in length with caudal. Eye 4.1, equal to somewhat convex interorbital space and 2.3 in snout. Relative length of sides of triangle, formed by middle of pupil, angle of preoperculum and snout (in this sequence) 1 : 1.6 : 1.4. Mouth slightly oblique, maxillary reaching to below anterior nostril. Canines moderate, anterior lateral teeth conical, posterior ones rounded and molarlike. Third, fourth and fifth dorsal spines of about equal length, as long as distance between hindborder of eye and a point midway between anterior and posterior nostril, much less than longest soft dorsal rays. Anal spines strong, the third longest and equal to distance between hindborder of eye and posterior nostril, shorter than longest soft anal rays. Pectorals somewhat more, ventrals somewhat less than eye and snout together. Caudal incised, the lobes rounded. Least height of caudal peduncle 1.5 in its length. Colour of alcohol specimens brownish above, yellowish below, with longitudinal yellowish bands, formed by spots on the scales. Head brownish. Dorsal and anal rays with dark annulations (Description made after a specimen of 270 mm length from Massawa in the Leiden Museum). Length over 300 mm.

Habitat: Celebes (North Celebes, Kait Point, Libani Bay); Ternate. — From Madagascar, eastcoast of Africa, Red Sea, coast of British India, Philippines, eastwards to Samoa.
In sea.

Note: This species, which seems to be very close to *L. nebulosus,* is rare in the Indo-australian Archipelago. We did not see any specimens from that region, neither did Bleeker.

Doubtful species

Lethrinus cinereus C.V.

Lethrinus cinereus Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 293.
Lethrinus cinereus Day, Fishes of India 1875, p. 135. — Fishes of British India II, 1889, p. 38.

Day gives as habitat of this species: "Seas of India, to the Malay Archipelago and beyond". We are unable to find any record of this species, which, according to Sauvage (Poissons de Madagascar, 1891, p. 200) has to be united with *L. frenatus* C.V., eastwards of British India.

26. Fam. Lobotidae.

Oblong, compressed, dorsally slightly elevated, covered with weakly ctenoid, regular scales of moderate or large size, smaller on head and base of median fins, forming a shallow sheath for spinous dorsal, lacking on praeocular part of head and jaws; lateral line complete, arched. Eye lateral, anterior. Two rounded approximate nostrils close before eye, the anterior with a rim. Mouth terminal, with oblique wide cleft reaching below eye; jaws nearly equal or the lower somewhat prominent, intermaxillaries protractile with a posterior pedicel of various extension; maxillary sheathed, without a supplimental bone. Preoperculum serrated, operculum with one or two flat spines. Six branchiostegals; pseudobranchiae present, gill-membranes united, free from isthmus. Suborbital edentulous, no subocular shelf. Posttemporal and postcleithrum denticulate. Narrow bands of villiform teeth in jaws, an outer series of more or less enlarged conical ones; none on vomer, palatines and tongue. Dorsal continuous, its spinous part much longer than soft with XII strong spines, depressible in shallow groove and 13—17 rays; anal with III strong spines, the second or third the longest; soft dorsal and anal opposite, rounded. Pectorals rounded, ventrals thoracal with 5 rays and a spine and a scaly axillary process. Caudal rounded with 15 branched rays.

Key to the indo-australian genera of Lobotidae

A. Eye in anterior third of head. Intermaxillary pedicels moderate not reaching frontals. Preoperculum coarsely dentate. The 3 anal spines graduate posteriorly . . . . 1. *Lobotes* p. 457.

B. Eye in anterior half of head. Intermaxillary pedicels long, extending opposite to hindborder of eye, situated in a depression of frontals. Preoperculum finely serrate. Second anal spine the longest. . . 2. *Datnioides* p. 460.

1. **Lobotes** Cuvier

(Cuvier, Règne animal ed. 2. II 1829, p. 177).

Oblong, compressed, dorsally somewhat elevated, covered with rather large weakly ctenoid scales, wanting on snout and jaws, smaller on head and basal part of soft median fins; lateral line complete, anteriorly arched. Head with prominent pointed short but rather broad snout and a concave dorsal profile. Eye small in anterior third of head. Two approximate rounded nostrils close before eye. Mouth oblique, terminal, the wide gape reaching below posterior border of eye, lower jaw prominent, upper protractile with moderate intermaxillary pedicel not reaching frontals. Maxillary for its major part concealed, without supplemental bone; lips thick. Preoperculum strongly denticulate with hooked teeth at angle, more so in young, as also the serration of postcleithrum and posttemporal. Operculum with two flat weak angular spines, disappearing in adult; suborbital bone narrower than eye. Six branchiostegals, gillrakers 6 + 15. Narrow bands of villiform teeth in jaws, an outer series of longer, curved conical ones. None on vomer, palatines and tongue. Dorsal continuous with XII spines, the median highest, depressible in a shallow groove, soft dorsal about one third shorter than spinous, opposite soft anal with III graduate spines, both fins lobed and high. Pectorals rounded, ventrals pointed, below base of pectoral, with a spine, five rays and a scaly axillary process. Caudal rounded.

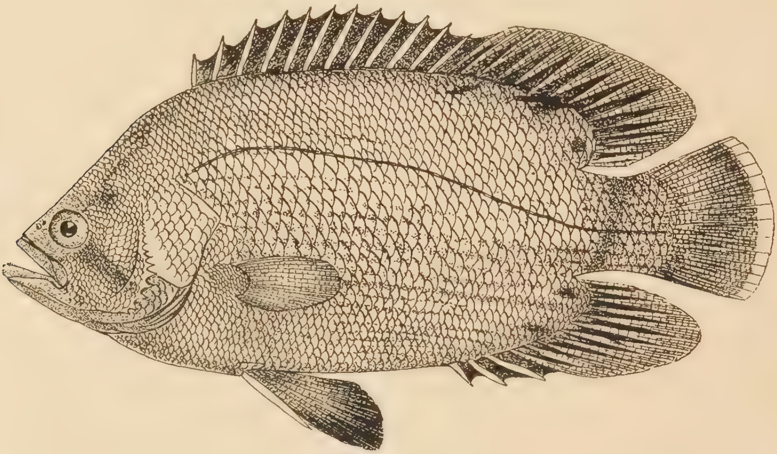

Fig. 91. *Lobotes surinamensis* (Bloch). × $^2/_3$.

Distribution: Carnivorous large fishes, growing to 1000 mm length, inhabiting the tropical atlantic coast of America, by exception straying into the Mediterranean [1]), frequenting the coasts and islands of the Indic, the Indo-Australian Archipelago, northwards extending to Southern China and Japan, southwards to New South Wales and Queensland. A second species is described as *Verrugato pacificus* (Gilbert) from the pacific coast of Panama.

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[1]) Döderlein, Atti Acad. Sci. Palermo V, 1875, p. 12.

1. **Lobotes surinamensis** (Bloch). (Fig 91)

Holocentrus surinamensis Bloch, Ausländ. Fische IV 1790, p. 98.

Holocentrus surinamensis Bloch, Schneider, Syst. Ichth. 1801, p. 316.

Holocentrus surinam Lacépède, Hist. Nat. Poiss. IV, 1802, p. 384.

Lobotes surinamensis Cuvier & Valenciennes, Hist. Nat. Poiss. V, 1830, p. 319.

Lobotes erate Cuvier & Valenciennes, loc. cit. p. 322.

Lobotes farkhari Cuvier & Valenciennes, loc. cit. p. 324.

Lobotes somnolentus Cuvier & Valenciennes, loc. cit. p. 324.

Lobotes erate Bleeker, Nat. Geneesk. Arch. Ned. Indië (3) II, 1845, p. 5.

Lobotes farkharii Bleeker, loc. cit. p. 523.

Lobotes incurvus Richardson, Ichth. China & Japan 1846, p. 237.

Lobotes citrinus Richardson ibidem.

Lobotes erate Bleeker, Verh. Batav. Gen. XXIII (1849) 1850, Sciaenoiden p. 26.

Lobotes erate Cantor, Journ. Asiat. Soc. Bengal XVIII (1849) 1850, p. 1062.

Lobotes erate Rüppell, Samml. Senckenb. Mus. 1852, p. 9.

Lobotes auctorum Günther, Cat. Brit. Mus. I, 1859, p. 338.

Lobotes erate Blyth, Journ. Asiat. Soc. Bengal XXIX, 1861, p. 141.

Lobotes surinamensis Day, Proc. Zool. Soc. London 1865, p. 14. — Fishes Malabar 1865, p. 23.

Lobotes auctorum Playfair, Fish. Zanzibar 1866, p. 28.

Lobotes auctorum Bleeker, Versl. Akad. Amsterdam (2) II, 1868, p. 291.

Lobotes surinamensis Bleeker, Atl. ichth. VIII 1876—1877, p. 12.

Lobotes surinamensis Day, Fish. India 4^0 1878—1888, p. 84.

Lobotes auctorum Macleay, Descr. Cat. Austral. Fish. I, 1881, p. 75.

Lobotes surinamensis Day, Fish. Brit. India I, 1889, p. 519.

Lobotes surinamensis Sauvage, Poiss. Madagascar 1891, p. 186.

Lobotes surinamensis Duncker, Mitth. Naturh. Mus. Hamburg XXI, 1904, p. 150.

Lobotes surinamensis Lloyd, Rec. Ind. Mus. I, 1907, p. 227.

Lobotes surinamensis Jordan & Thompson, Proc. U. S. Nat. Mus. XXXIX, 1911, p. 436.

Lobotes surinamensis Jordan, Tanaka & Snyder, Journ. Coll. Sci. Tokyo, XXXIII, 1913, p. 162.

Lobotes surinamensis Mc Culloch, Check List Fish. N. S. Wales II, 1919, p. 57.

Lobotes surinamensis Barnard, Ann. S. Afric. Mus. XXI, 1925—27, p. 638.

Lobotes surinamensis Marshall, Mem. Queensland Mus. IX, 1928, p. 190.

Lobotes surinamensis Fowler, Fish. Oceania Bishop Mus. X, 1928, p. 192.

Lobotes surinamensis Mc Culloch, Checklist Austral. Fish. Austral. Mus. V, 1929, II, p. 211.

Lobotes surinamensis Duncker & Mohr, Mitt. Zool. Mus. Hamburg XLIV, 1929, p. 61.

Lobotes surinamensis Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 48.

Lobotes surinamensis Fowler, Bull. U. S. Nat. Mus. XI, 1931, p. 44.

Lobotes surinamensis Delsman & Hardenberg, Ind. Zeevisschen 1934, p. 232.

D. XII, 15—16; A. III, 11; Ll. 42—44; Ltr. $\frac{9-10}{16-18}$.

Height more or less than twice in length, head 2.5 to nearly 3. Eye according to size 5 to more than 8 in head, 1.2 to 2.7 in convex interorbital space; equal to or twice in short broad snout which goes 4 to 4.5 in length of head. Upper jaw extending to below posterior half or hindborder of eye; suborbital lower than diameter of pupil. Scales round posterior half of eye small, somewhat larger on front and occiput, more so on chest and opercles; on operculum in seven to eight oblique rows, on preoperculum behind cheeks in about sixteen to seventeen transverse rows, its posterior border dentate, the rounded somewhat prominent angle with upward hooked teeth in young, later on spiniform, diminishing in size in old, continued but getting smaller on posterior half of lower border. Spinous dorsal more than one third longer than soft which is much higher than spinous dorsal and than the opposite also lobed soft anal. Pectorals about as long as postocular part of head, ventrals slightly longer. Caudal rounded, least height of its peduncle more than twice in head. For other characters see those of the genus. Colour olivaceous to brownish, darker on head and back, somewhat silvery on inferior part of head and chest, pectorals and margin of caudal pale yellowish, other fins olivaceous. Length up to 1000 mm.

Nomen indig: Kakap batu, Sampang (Malay. Java); Pela batu, Kakap telassi, Tjabak watu (Javan.).

Habitat: Singapore; Sea of Pinang; Banka; Bintang; Sumatra (Telok betong); Java (Batavia!, Surabaja, Pasuruan, Semarang); Madura; Borneo (Singkawang, Pamangkat, Sandakan); Celebes (Makassar!, Badjoa); Ceram; Ambon!; Waigeu!; New Guinea. — East coast of Africa to Natal, Madagascar, Seychelles, British India, Ceylon, Andamans, Malacca, Cochinchina, China (Canton, Hongkong, Kowloon), Southern Japan, Philippines, Australia (N. S. Wales, Queensland). Tropical Atlantic coast of America, a straggler into Mediterranean. A marine coastal fish, entering rivers in Borneo and Endeavour River (Australia); much valued as food.

2. **Datnioides** Bleeker

(Bleeker, Nat. Tijdschr. Ned. Indië V, 1853 p. 441).

(Type *Coius polota* Ham. Buch).

Oblong, dorsally elevated, head till above eyes and body covered with ctenoid regular scales of small or moderate size, smaller on base of soft median fins, wanting on jaws and suborbital; lateral line arched, complete. Head pointed, eye lateral, of medium size, in anterior half of head. Two approximate nostrils, the posterior the smallest, close to eye. Mouth terminal, the oblique cleft wide, reaching below eye, jaws nearly equal, intermaxillaries protractile with a long pedicel extending opposite to hindborder of eye, situated in a depression of frontals; maxillary concealed nearly in its total length. Preoperculum finely serrated, operculum with one or two blunt, flat spines; posttemporal denticulate, suborbital edentulous, no subocular shelf. Six branchiostegals, pseudobranchiae present, gillmembranes united, free from isthmus. Jaws with a band of small villiform teeth, outside a series of stronger inward curved teeth, none on vomer, palatines and tongue. Single dorsal, the spinous part about twice longer than soft, with XII strong heteracanth spines and 13—17 rays forming a short rounded fin; anal similar with III strong heteracanth spines, the second by far the longest. Pectorals rounded; ventrals below pectorals, with a scaly axillary process, with a spine and 5 rays, the first prolonged into a shorter or longer filament.

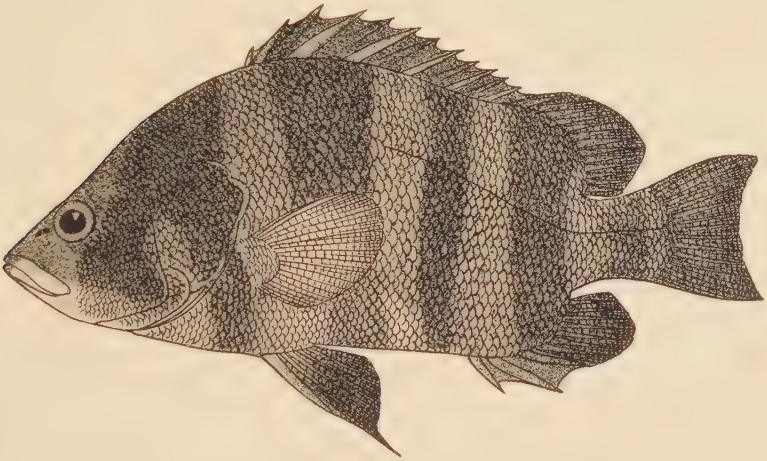

Fig. 92. *Datnioides quadrifasciatus* (Sevastianov). × 1/2

Distribution: Carnivorous fishes of medium or small size living in brackish and freshwater of great rivers and lakes of Borneo, New Guinea. — British India, Burma, Peninsular Siam and Cochinchina.

Key to the indo-australian species of Datnioides

1. 13—14 dorsal rays; Ll. ca. 55; Ltr. $\frac{10-12}{18-19}$. The eight transverse bands with age confluent to four or totally diffuse 1. *D. quadrifasciatus* p. 462.
2. 15—16 dorsal rays. Ll. 60—62; Ltr. $\frac{15-16}{18}$ The eight transverse bands in all ages defined . . . . 2. *D. microlepis* p. 463.

1. **Datnioides quadrifasciatus** (Sevastianov) (Fig. 92)

Chaetodon quadrifasciatus Sevastianov, Mém. Acad. Sci. St. Pétersbourg I, 1809, p. 448.
Coius polota Hamilton, Buchanan, Fish. Ganges 1822, p.p. 95, 370.
Coius binotatus Gray, Illustr. Indian Zool. II Pisces 1833—34, pl. 2, fig. 2.
Coius binotatus Schlegel, Fauna Japon. Poiss. 1842, p. 17.
Coius polota Schlegel, ibidem.
Coius polota Richardson, Ichth. Voy. Sulphur 1844, p. 83.
Lobotes hexazona Bleeker, Nat. Tijdschr. Ned. Indië I, 1851, p. 9. — Op. cit. III, 1852, p. 411.
Datnioides polota Bleeker, Nat. Tijdschr. Ned. Indië V, 1853, p. 441. — Verh. Batav. Gen. XXV, 1853, Voor-Indië p. 82. — Nat. Tijdschr. Ned. Indië XX, 1859—60, p. 101.
Datnioides polota Günther, Cat. Brit. Mus. I, 1859, p. 339.
Datnioides polota Kner, Novara-Exp. Fische 1865—67, p. 50.
Datnioides polota Bleeker, Arch. Néerl. Sc. Nat. (1875) 1876, p. 272.
Datnioides polota v. Martens, Exp. Ost-Asien 1876, p. 387.
Datnioides quadrifasciatus Bleeker, Atl. ichth. VIII, 1876—77, p. 32.
Datnioides polota Day, Fish. India 4° 1878—1888, p. 96.
Datnioides quadrifasciatus Day, Fish. 4° India Supplement 1888, p. 786. — Fish. Brit. India I, 1889, p. 534.
Datnioides polota Vinciguerra, Ann. Mus. Civ. Genova (2) IX, 1890, p. 162.
Coius quadrifasciatus Fowler, Proc. Acad. Nat. Sci. Philadelphia (2) LVII, 1905, p. 504.
Datnioides polota Lloyd, Rec. Ind. Mus. Calcutta I, 1907, p. 227.
Datnioides quadrifasciatus M. Weber, Nova-Guinea IX, Zoolog. 1913, p. 570.
Datnioides quadrifasciatus Hora, Journ. Nat. Hist. Soc. Siam VI, 1923, p. 176.
Coius quadrifasciatus Chaudhuri, Mem. Indian Mus. V, 1923, p. 713.
Datnioides quadrifasciatus Hora, Mem. Asiat. Soc. Bengal VI, 1924, p. 486.
Datnioides polota Vinciguerra, Ann. Mus. Civ. Genova (3a) X (L) 1926, p. 587.
Datnioides polota Fowler & Bean, Bull. U. S. Nat. Mus. XI, 1931, p. 324.
Datnioides quadrifasciatus Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 212.

D. XII, 13—14; A. III, 8—9; Ll. ca. 55; Ltr. $\frac{10-12}{18-19}$.

Compressed, oblong, dorsal profile elevated, ventral nearly straight, height 2 to 2.3 in length; head 2.2 to 2.8, pointed, the rostro-dorsal profile slightly concave till nape. Eye 4.8 to 5.5 in head, situated in anterior third of head, its diameter longer than flatly convex interorbital space, shorter than snout, which goes 3.5 to 3.8 in head. Cleft of mouth rather wide, oblique, lips thick, jaws nearly equal, intermaxillary protractile with a long pedicel extending to opposite posterior border of orbit; upper jaw reaching to below border of eye. Bands of fine teeth in jaws, the outer series enlarged, none on palate and tongue. Operculum pointed with a short, blunt spine and about 9 transverse series of scales, preoperculum with an obtusely rounded angle, above it somewhat more conspicuously serrated. Spinous dorsal more than twice longer than soft, which is rounded, the highest rays being in adult somewhat higher than the third to sixth spines which are the highest, the fifth going about 3 to 3.3 in height of body and about 1/3 of length of head. Anal rounded with three strong spines, the second the longest and strongest, about twice length of eye. Pectorals rounded, as long as postocular part of head. Ventrals of equal length but the first ray filamentous prolonged slightly surpassing vent. Caudal rounded, least height of its peduncle nearly twice diameter of eye. Olivaceous, dorsally darker, ventrally lighter, with about 8 to 10 dark brown transverse bands on sides and on caudal peduncle, about 6 of which are broader and complete, the others narrower, shorter and intermediate, in old specimens partly confluent, broader and reduced to four, in juvenile state better defined with a blackish opercular blotch and three bands on head radiating from eye to snout, back and interoperculum which flow together in old specimens into large black patches; median fins and ventrals blackish. Length up to 305 mm.

Habitat: Living in brackish water of the mouth of large rivers and ascending into the fresh water of these above tidal influence, entering also lakes as the indian Chilka lake and the siamese lake Talé Sep with seasonal variation of salinity. In the Archipelago only known from Sumatra (Palembang!, Belawan!); Borneo (Singkawang, Sambas, Pontianak, Kukajan, Bandjermasin, Serawak) and New Guinea (Lorentz River! and an adjacent ditch!). Erroneously recorded from Java by Kner as Bleeker has shown (Atl. ichth. VIII, p. 33). It is also known from estuaries of the Ganges, from Burma, Peninsular Siam, from the above named lakes, Ceylon?, Cochinchina.

2. **Datnioides microlepis** Blkr.

Datnioides microlepis Bleeker, Nat. Tijdschr. Ned. Indië V, 1853, p. 442. — Op. cit. XX, 1859—60, p. 101.

Datnioides microlepis Günther, Cat. Brit. Mus. I, 1859, p. 339.
Datnioides microlepis von Martens, Arch. f. Naturgesch. XXXIV, 1868, p. 9. — Preuss. Exp. Ost-Asien 1876, p. 307.
Datnioides microlepis Bleeker, Atl. ichth. VIII, 1876—77, p. 32.
Datnioides microlepis Pellegrin & Chevey, Bull. Soc. Zool. France LII 1927, p. 301.
Datnioides microlepis Fowler, U. S. Nat. Mus. XI 1931, p. 323.
Datnioides microlepis Chevey, Poiss. campagnes du Lanessan, I Iconogr. ichth. Indochine 1932, p. 68.

D. XII, 15—16; A. III, 9—10; Ll. 60—62; Ltr. $\frac{15-16}{18}$.

Compressed, oblong-elevated, dorsal profile more convex than ventral, height more than twice in length, head about 2.3, pointed, rostro-frontal profile slightly concave in adult. Eye 3.5 to 4 in head situated in its anterior half, eye diameter nearly equal to or somewhat shorter than flattened interorbital space and equal to or slightly shorter than pointed snout. Cleft of mouth oblique, jaws equal, the upper reaching to below middle of eye. Preoperculum finely serrate, with a rounded angle; operculum with 13—15 transverse series of scales and a flat spine at angle. Teeth small pluriseriate, none on vomer, palatines or tongue. Spinous dorsal less than twice longer than strongly rounded soft dorsal, the highest rays of which are not longer than the highest third, fourth and fifth spines which go about 2 times in length of head. Anal strongly rounded, second spine the longest, more or less than 2 eye diameters. Pectorals obtusely rounded, about equal to acute ventrals, the first ray of which is produced into a short filament. Caudal rounded, least height of its peduncle nearly thrice in length of head. Juvenile colour of body and fins red to rosy, later yellowish, on head a blackish band from occiput to eye and continued on cheek, in the specimens from the Archipelago seven similar broad bands on sides, the first from nape to chest, crossing operculum, the second from origin of dorsal to belly, the third and fourth from spinous dorsal to anal, the fifth from soft dorsal to anal, the sixth on caudal peduncle and base of caudal; in the continental species there is one band less as the second and third are united, as a racial geographical difference according to Chevey. Length up to 350 mm.

Habitat: Borneo (River Kapuas, Pontianak!, Sintang, Danau Sriang). — Cambodja, Siam!. In fresh water.

27. Fam. SPARIDAE.

Oblong, more or less compressed; covered with large, moderate or small ciliated scales. Snout, pre- and suborbital naked. Vertical fins naked or with a low scaly sheath. Eyes moderate. Two nostrils on each side. Mouth moderately protractile, the premaxillary pedicels not or scarcely reaching to frontals; maxillary more or less expanded forward distally, but without distinct notch in its anterior edge. The distal end of the premaxillary ramus overlaps the maxillary externally. Gillmembranes free from isthmus and from each other. Five to seven branchiostegals. Palate edentulous. Teeth in the jaws conical, incisors or molar-like. Canines present or absent. A strong subocular shelf, developed forwards from the second suborbital and mainly internal to the first. One dorsal fin, formed by a spinous and soft portion of nearly equal development. Anal with three spines. Pectorals long, acute. Ventrals with one spine and five branched rays. Vertebrae 24 (10 + 14).

Distribution: Herbi- and carnivorous fishes from all temperate and tropical seas: a few entering rivers.

1. **Sparus** Linné

(Linné, Syst. Nat. ed. Xa 1758, p. 277)

Chrysophris Cuvier, Règne Animal 2. ed. II, 1829, p. 18.

Oblong, somewhat compressed, covered with moderate or small ciliated scales. Scales beginning on head between or somewhat behind eyes. Anteriorly in each jaw a row of canines or incisors, followed by several rows conical or rounded teeth, becoming larger and molar-like posteriorly. Palate edentulous. Dorsal consisting of XI—XII spines and 10—15 rays. Anal with III spines, the second of which is generally the longest and 7—13 soft rays. Pectorals very long and pointed. Ventrals with one spine and five branched rays.

Distribution: Coasts of Indo-Pacific.

Key to the indo-australian species of Sparus

I. Dorsal spines flexible, flattened, the second to fifth prolonged into long filaments. Dorsal profile much arched. Profile of head very steep (*Argyrops*) . . . . 1. *S. spinifer* p. 466.

II. Dorsal spines rigid, none of them produced. Head more pointed (*Sparus* s. str.).
  A. Front teeth in each jaw incisors. D. XI. 13 (14) A. III. 11 (12). Ll. 55—60 . . . . 2. *S. sarba* p. 468.
  B. Front teeth in each jaw canines. D. XI—XII. 11—12. A. III. 7—9. Ll. 43—50.
    1. Canines vertical. 4—5 scales between Ll. and median dorsal spines. No bands on head.
      a. Five scales above Ll. A conspicuous black spot at origin of pectoral . . . . 3. *S. australis* p. 469.
      b. Four scales above Ll. No dark spot at origin of pectoral . . . . 4. *S. berda* p. 470.
    2. Canines directed obliquely forward. 6½ scales between Ll. and median dorsal spines. Two vertical dark bands on head . . . . 5. *S. bifasciatus* p. 473.

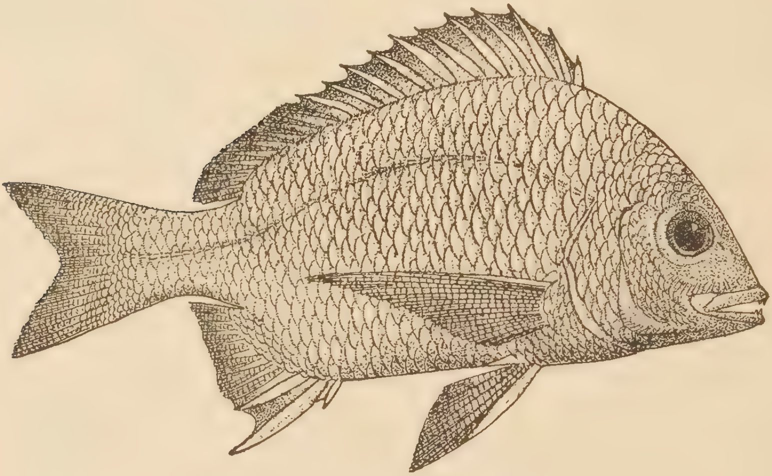

Fig. 93. *Sparus berda* Forsk. × 1/3.

1. **Sparus spinifer** Forsk.

Sparus spinifer Forskål, Descr. Animalium 1775, p. 32.
Sparus spinifer Bloch Schneider, Syst. Ichthyol. 1801, p. 281.
Sparus spinifer Lacépède, Hist. Nat. Poissons IV, 1802, p. 29, p. 97.
Pagrus spinifer Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 156.
? *Pagrus filamentosus* Cuvier & Valenciennes, ibid. p. 158.
Pagrus longifilis Cuvier & Valenciennes, ibid. p. 159.
Pagrus spinifer Rüppell, Neue Wirbelthiere, Fische 1835, p. 114.
Pagrus longifilis Bleeker, Nat. Tijdschr. Ned. Indië III, 1852, p. 756.
Pagrus spinifer Günther, Cat. Brit. Mus. I, 1859, p. 472.
Pagrus filamentosus Bleeker, Acta Soc. Sc. Indo-Neerl. VIII, 1860, p. 22 (nec. C.V.?).

Chrysophrys spinifera Steindachner, Verh. zool. bot. Gesellsch. Wien XI, 1861, p. 179.
Pagrus spinifer Klunzinger, ibid. XX, 1870, p. 761.
Pagrus spinifer Day, Fishes of India, 1875—1888, p. 138.
Sparus spinifer Bleeker, Atl. Ichth. VIII, 1876—1877, p. 109.
Sparus (Pagrus) spinifer Klunzinger, Fische des rothen Meeres I, 1884, p. 43.
Sparus (Pagrus) spinifer Pfeffer, Jahrb. Hamburg, wiss. Anst. V, 1893, p. 10.
Argyrops longifilis Jordan & Evermann, Proc. U.S. Nat. Mus. XXV, 1902, p. 350.
Pagrus spinifer Fowler & Bean, Proc. U.S. Nat. Mus. LXII, 1922, p. 40.
Argyrops spinifer Mc Culloch, Mem. Queensland Mus. VII, Prt. IV, 1922, p. 242.
Pagrus spinifer Barnard, Ann. S. Afric. Mus. XXI, 1925--1927, p. 696.
Pagrus spinifer Herre & Montalban, Philip. Journ. Science XXXIII, 1927, p. 428.
Argyrops spinifer Fowler, Bull. U.S. Nat. Mus. Vol. XII, 1933, p. 143.

D. XI. 10. A. III. 8 (9). P. 2. 13. V. I. 5. Ll. 54. Ltr. $\begin{matrix}6\\1\\17\end{matrix}$.

Body very deep. Dorsal profile much arched. Profile of head very steep, the tip of the snout only about one eye-diameter before vertical through frontborder of eye, but its distance from eye is equal to 1.7 eye-diameters. Height 1.8, 2.2—2.3 in length with caudal. Head 3—3.1, 3.9 in length with caudal, 1.5 in height of head, measured in vertical through hindborder of preoperculum Eye 3.1, more than somewhat convex interorbital space and 1.7 in snout. Maxillary reaching to vertical through frontborder of eye. Mouth somewhat oblique. Four canines in front of upper jaw and 3 rows of molars on each side; 6 much smaller canines in the lower jaw and 2 rows of molars on each side behind them. Scales on upper part of head extending in a triangular prolongation to between eyes. Preoperculum with 5 transverse rows of scales. Dorsal spines flexible, laterally flattened, almost ribbon-shaped; the second to fifth prolonged into long filaments, that of the second spine reaching to base of caudal when depressed. Soft dorsal and anal rounded, truncate behind. First anal spine less than half length of second, which is somewhat longer and stronger than third and equal to snout. Pectorals much longer than head, about equal to distance between isthmus and anus. Ventrals with the first ray produced, equal to length of head. Caudal forked. Least height of caudal peduncle 1.2 in its length. Colour of preserved specimens brownish. Length 600 mm (Description made after specimens of Bleeker's collection in the Leiden Museum).

Habitat: West coast of Sumatra. Celebes (Bulukomba!, Makassar!). — Coast of Natal, Madagascar, Zanzibar, Red Sea, Persian Gulf, Mauritius, coast of British India, Philippines, Formosa, Queensland.

In sea, down to 130 M.

2. **Sparus sarba** Forsk.

Sparus sarba Forskål, Descr. Animalium 1775, p. 31.
Sparus sarba Bloch Schneider, Syst. Ichth. 1802, p. 280.
Sparus sarba Lacépède, Hist. Nat. Poissons IV, 1802, p. 30.
Chrysophrys sarba Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 102.
Chrysophrys aries Schlegel, Fauna Japonica, Poissons 1843, p. 67.
Chrysophrys aries Bleeker, Verh. Bat. Gen. XXVI, 1854—1857, p. 87.
Chrysophrys sarba Günther, Cat. Brit. Mus. I, 1859, p. 488.
Chrysophrys aries Günther, ibid. p. 489.
Chrysophrys sarba Kner, Novara Exp. Fische I, 1865, p. 88.
Chrysophrys sarba Klunzinger, Verh. zool. bot. Gesellsch. Wien XX, 1870, p. 759.
Sparus aries Bleeker, Ned. Tijdschr. Dierk. VI (1871), 1872, p. 138.
Chrysophrys haffara Day, Fishes of India 1875—1888, p. 142 (nec Forsk.).
Chrysophrys sarba Day, l.c.
Sparus sarba Bleeker, Atl. Ichth. VIII, 1876—1877, p. 107.
Chrysophrys sarba Macleay, Descr. Cat. Austr. Fish. I, 1881, p. 118.
Chrysophrys aries Steindachner & Döderlein, Denkschr. Akad. Wien XLVIII, 1883, p. 18.
Sparus (Chrysophrys) sarba Klunzinger, Fische des rothen Meeres I, 1884, p. 43.
Chrysophrys aries Day, Fauna Brit. India, Fishes II, 1889, p. 46.
Chrysophrys sarba Day, ibid. p. 47.
Chrysophrys sarba Sauvage, Poissons de Madagascar 1891, p. 195.
Sparus sarba Jordan & Seale, Proc. Davenport Acad. Science X (1905), 1907, p. 10.
Sparus aries Jordan & Thompson, Proc. U.S. Nat. Mus. XLI, 1912, p. 581.
Sparus sarba Mc Culloch, Rec. Western Austr. Mus. I (2), 1912, p. 89.
Sparus sarba Jordan & Starks, Ann. Carnegie Mus. XI, Nos. 3—4, 1917, p. 451.
Sparus sarba Mc Culloch, Checklist of fish New S. Wales III. Austr. Zool. II, Prt. III, 1922, p. 88.
Sparus sarba Barnard, Ann. S. Afric. Mus. XXI, 1925—1927, p. 687.
Sparus sarba Fowler, Bull. U.S. Nat. Mus. XII, 1933, p. 149.

D. XI. 13 (14). A. III. 11 (12). P. 2.13. V. I. 5. Ll. 55—60 Ltr. $\dfrac{7}{\dfrac{1}{13}}$.

Dorsal profile strongly arched from snout to dorsal. Height 2.1, 2.7 in length with caudal. Head 3.2, 4.1 in length with caudal. Eye 3.6—4.5, more or less than snout, according to age; in young equal to, in older specimens less than convex interorbital space. Mouth almost horizontal. Maxillary reaching to below anterior half of eye. A row of incisors anteriorly in each jaw, followed by 4 rows of molars in the upper jaw and 3 rows of similar teeth in the lower jaw, the posterior ones of middle row in the lower jaw and of third row in the upper jaw largest. Four to five transverse rows of scales on preoperculum. Third to fifth dorsal spines longest, equal to postorbital part of head, slightly less than second anal spine, which is somewhat longer than third. Soft dorsal and anal rounded, truncate behind. Pectorals about as long as distance between snout and origin of pectorals. Ventrals equal to head without snout. Caudal deeply emarginate, least height of caudal peduncle 1.3 in its length. Colour of alcohol specimen brownish above, with silvery reflections, silvery below. Fins hyaline. Length 400 mm (Description made after a specimen from Japan).

Habitat: Moluccos?. — Coast of Natal, Madagascar, Zanzibar, Red Sea, Mauritius, coasts of British India, Japan, China, Australia.

In sea.

Note. The occurence of this species in the Indo-australian Archipelago, although probable, is not certain. The habitat Moluccos is based on the supposition of Cuvier & Valenciennes, that a drawing of de Vlamingh, reproduced by Renard, refers to this species. Bleeker has pointed out (Atl. Ichth. l.c.) that the drawing might as well represent a species of *Plectorhynchus* and that de Vlamingh moreover also depicted fishes from Mauritius.

3. **Sparus australis** (Gthr.)

Chrysophrys australis Günther, Cat. Brit. Mus. I, 1859, p. 494.
Chrysophrys australis Steindachner, Sitzber. Akad. Wiss. Wien. Math. nat. Kl. LIII, Pt. I. 1866, p. 434.
Chrysophrys australis Castelnau, Proc. Zool. Acclimat. Soc. Victoria. I. 1872, p. 71.
Chrysophrys australis Klunzinger, Arch. Naturgesch. XXXVIII, 1872, p. 21. Sitzber. Akad. Wien. Wiss. Math. nat. Kl. LXXX, 1880, p. 357.
Chrysophrys australis Macleay, Descr. Cat. Austr. Fish. I, 1881, p. 119.
Chrysophrys Australis De Vis, Proc. Linn. Soc. New S. Wales VIII, 1883, p. 457.
Chrysophrys australis Lucas, Proc. Roy. Soc. Victoria (2) II, 1890, p. 20.
Sparus australis Mc Culloch, Rec. Western Austr. Mus. I (2), 1912, p. 89.
Sparus australis Roughley, Fishes of Australia, 1916, p. 134.
Sparus australis Waite, Rec. South Austr. Mus. II, No. 1, 1921, p. 109.

Sparus australis Mc Culloch, Checklist of fish New S. Wales III. Austr. Zool. II, Prt. III, 1922, p. 88.
Roughleyia australis Whitley, Austr. Zool. VI, Prt. IV, 1931, p. 318.
Sparus australis Fowler, Bull. U.S. Nat. Mus. Vol. XII, 1933, p. 151.

D. XI—XII. 11—12. A. III. 7—9. Ll. 43—46. Ltr. $\begin{array}{c} 5 \\ \hline 1 \\ \hline 12-13 \end{array}$.

Height 2.1—2.3, 2.9 in length with caudal. Head 2.8—3, almost 4 in length with caudal. Eye 2.7—4.3, greater than snout in young to 1.8 with age. Maxillary reaching to below anterior border of eye or somewhat farther. Six canines in each of the jaws, with a villiform band behind them. The outer series of the lateral ones is formed by rather conical teeth. There are four to five rows in the upper jaw, the posterior teeth gradually becoming larger. Three to four rows in the lower jaw, which have the largest teeth also posteriorly, but there are several other small ones at the hindmost extremity of the jaw. Five transverse rows of scales on preoperculum. First dorsal spine two fifths of the second; the fourth is the longest, nearly one half of the length of the head; the following gradually decrease, the last being about two thirds of the fourth. First anal spine very short, the second equal to the fourth dorsal spine, though stronger; the third is more feeble and shorter. Pectorals reaching to origin of the soft anal; ventrals much shorter, not extending to anus. Caudal emarginate, with pointed lobes. Coloration of preserved specimens uniform silvery, grey on the upper parts. Dorsal blackish, with a black edge on the spinous portion. Caudal with a broad blackish margin, anal and ventrals blackish. A conspicuous black spot or dot at the origin of the pectoral. Length 550 mm (Compiled, not seen by us).

Habitat: New Guinea. — Coasts of Australia.

In sea, entering rivers.

4. **Sparus berda** Forsk. (Fig. 93. p. 466)

Sparus berda Forskål, Descr. Animalium 1775, p. 32.
Sparus hasta Bloch Schneider Syst. Ichth. 1801, p. 275.
Chrysophrys berda Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 113.
Chrysophrys calamara Cuvier & Valenciennes, ibid. p. 117.
Chrysophris berda Rüppell, Neue Wirbelthiere, Fische 1835, p. 120.
Chrysophrys Berda Bleeker, Nat. & Geneesk. Arch. Ned. Indië II (3), 1845, p. 522.
Chrysophrys calamara Bleeker, Verh. Bat. Gen. XXIII (1849), 1850, Spar. p. 10.

Chrysophrys calamara Cantor, Journ. Asiat. Soc. Bengal XVIII, 1850, p. 1030.
Chrysophrys hasta Günther, Cat. Brit. Mus. I, 1859, p. 490 (partim).
Chrysophrys hasta Kner, Novara Exp. Fische I, 1865, p. 88.
Chrysophrys berda Klunzinger, Verh. zool. bot. Gesellsch. Wien XX, 1870, p. 758.
Sparus calamara Bleeker, Ned. Tijdschr. Dierk. IV (1871), 1872, p. 138.
Chrysophrys datnia Day, Fishes of India, 1875—1888, p. 140, p. 788 (nec. H.B.?).
Sparus hasta Bleeker, Versl. Akad. Amsterdam (2) XI (1875), 1876, p. 9. Atl. Ichth. VIII, 1876—1877, p. 108.
Sparus datnia Bleeker, ibid. p. 8. Ibid. p. 109 (nec. H.B.?).
Chrysophrys hasta Macleay, Descr. Cat. Austr. Fish. I, 1881, p. 118.
Sparus berda Klunzinger, Fische des rothen Meeres I, 1884, p. 44.
? *Chrysophrys hasta* Sauvage, Poissons de Madagascar 1891, p. 195.
Sparus berda Jordan & Evermann, Proc. U.S. Nat. Mus. XXV, 1902, p. 350.
Chrysophrys berda Steindachner, Denkschr. Akad. Wien LXXI, 1902, p. 135.
Sparus calamara Seale, Philip. Journ. Science V, No. 4, 1910, p. 277.
Sparus datnia Bean & Weed, Proc. U.S. Nat. Mus. XLII, 1912, p. 606 (nec. H.B.?).
Sparus berda M. Weber, Siboga Exp. Fische 1913, p. 292.
Sparus datnia M. Weber, l.c. (nec H.B.?).
Pagrus berda Barnard, Ann. S. Afric. Mus. XXI, 1925—1927, p. 703.
Sparus berda Herre & Montalban, Philip. Journ. Science XXXIII, 1927, p. 430.
Sparus berda Fowler, Bull. U.S. Nat. Mus. Vol. XII, 1933, p. 157.

D. XI. 11 (12). A. III. 8—9. P. 2. 13—14 1). V. I. 5. Ll. 46—50.

Ltr. $\begin{array}{c}4\\\hline 1\\\hline 11-12\end{array}$.

Height 2—2.1, 2.5—2.6 in length with caudal. Head 2.8—3.1, 3.5—3.8 in length with caudal. Eye 3.9—4.6, 1.4—1.8 in snout and according to age 1—1.7 in somewhat convex interorbital space. Mouth slightly oblique. Lips thick. Maxillary reaching to below frontborder of pupil or somewhat farther back. Lower jaw slightly included. Teeth in jaws in 3—5 crowded rows, anteriorly about six curved canines in the upper jaw, and four in the lower jaw. The teeth behind the canines moderate, granular or somewhat conical, the outer row and the posterior ones of the inner rows much larger, molariform. Suborbital almost as deep as diameter of eye in large specimens, much lower in small specimens. Five transverse rows of scales on preoperculum. Dorsal spines strong, heteracanth. First, half as long as second, which is shorter than third. Third

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1) In one specimen we find P. 1. 14.

to fifth spines or fourth spine longest, equal to (in large specimens) or somewhat longer than postorbital part of head. Soft dorsal lower than spinous part, rounded. First anal spine short, much less than eye. Second spine very long and strong, laterally compressed, its length equal to or more or less than head without snout, its breadth as much as half diameter of eye. Third anal spine much shorter and less strong than second spine, equal to or longer than snout. Anterior rays of soft anal, which is rounded, somewhat longer than third spine. Pectorals long and much pointed, equal to distance between end of snout and origin of ventrals. Ventrals, with the first ray slightly produced, somewhat less than head. Ventral spine equal to or longer than postorbital part of head. Caudal deeply emarginate, the lobes more or less rounded. Least height of caudal peduncle 1.1—1.2 in its length. Colour of preserved specimens silvery, base of each scale of body brown, especially those of the back. Vertical fins more or less dusky, much darker to almost black along their outer border. Pectorals and ventrals yellowish, ventrals dusky in their distal half. Length over 370 mm.

Nomen indig.: Okeh, Kapas, Bekukung (Malay), Katombal (Javanese).

Habitat: Singapore; Sumatra (Benkulen); Bintang; Java (Batavia, Pelabuan Ratu, Semarang, Surabaya, Tjilatjap); Madura; Borneo (Balikpapan!, Sandakan); Bali; Lombok!; Sumbawa; Celebes (Makassar!); Saleyer!; New Guinea (Gulf of Papua). — East coast of Africa from Natal, Madagascar, Red Sea, Sokotra, coast of Arabia and of British India, Andamans, Tonkin, China, Japan, Riu-Kiu Islands, Formosa, Philippines, Queensland, New Britain, Solomon Islands.

In sea, estuaries and rivers.

Note. We have compared a specimen of *Sparus hasta* of Bleeker's collection in the Leiden Museum, length 161 mm, with a specimen of *Sparus datnia* from the same collection, long 173 mm. We find the following differences. Height 2 in *hasta*, 2.4 in *datnia*. Length of head 3 in both specimens, 1.26 in depth of head (measured in vertical through hindborder of preoperculum) in *hasta*, 1.18 in *datnia*. There is no difference in the caudal peduncle, its height 1.2 in its length in both specimens. The scales are only partly preserved; we count about 43 scales in the Ll. in *hasta*, and about 45 in *datnia*. In both there are 4 scales between the Ll. and the median dorsal spines. There is no difference in the dentition and in both specimens the 3rd—5th dorsal spines are longest, as long as snout and eye together in *datnia*, scarcely shorter in *hasta*. The second anal spine is equal to head without snout in both. The only difference of some importance is therefore the height. The specimen of *datnia* is more slender and in consequence the depth of body and head is less, but we don't think this sufficient to keep them apart. Bleeker's specimens of *datnia* come from Japan, and they may represent a local race. We are not sure that they are identical with *Coius datnia* H.B. from the mouth of the Ganges. All specimens from the Indo-australian Archipelago seen by us, including those previously described by one of us as *datnia*, agree with *hasta* Blkr., which is, according to Klunzinger, the same as *berda* from the Red Sea.

5. **Sparus bifasciatus** (Forsk.)

Chaetodon bifasciatus Forskål, Descr. Animalium 1775, p. 64.
Chrysophrys bifasciata Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 118.
Chrysophris bifasciatus Rüppell, Neue Wirbelthiere, Fische 1835, p. 112, p. 120.
Chrysophrys bifasciata Günther, Cat. Brit. Mus. I, 1859, p. 488.
Sparus bifasciatus Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 278.
Chrysophrys bifasciata Klunzinger, Verh. zool. bot. Gesellsch. Wien XX, 1870, p. 758.
Chrysophrys bifasciata Day, Fishes of India 1875—1888, p. 141.
Sparus bifasciatus Bleeker, Atl. Ichth. VIII, 1876—1877, p. 107.
Chrysophrys bifasciata Sauvage, Poissons de Madagascar 1891, p. 193.
Pagrus bifasciatus Barnard, Ann. S. Afric. Mus. XXI, 1925—1927, p. 703.

D. XI. 12. A. III. 10. P. 2. 13. V. I. 5. Ll. 50. Ltr. $\begin{array}{c}6\frac{1}{2}\\ \hline 1\\ \hline 12-13\end{array}$.

Height 1.8—2.1, 2.7 in length with caudal. Head 2.5—3.1, 3.9 in length with caudal, 1.1—1.2 in height of head, measured in vertical through hindborder of preoperculum. Eye 3.3—4, equal to slightly convex interorbital space and 1.2—1.4 in snout. Mouth somewhat oblique. Lips thick. Maxillary reaching frontborder of pupil. In each jaw six canines anteriorly, directed obliquely forwards. Five rows of molars in each side of upper jaw, covering almost the whole roof of the mouth; four rows in each ramus of lower jaw. Five to six transverse rows of scales on preoperculum. First dorsal spine about half length of second, which is shorter than third. Third to fifth spines longest, nearly equal to snout and eye together. First anal spine short, second longest and somewhat longer than longest dorsal spines. Pectorals longer than head, as long as distance between end of snout and axil of pectorals. Ventrals equal to distance between end of snout and hindborder of preoperculum. Caudal slightly emarginate. Two vertical dark bands on head, one from interorbital space through eye over suborbital down to behind corner of mouth and a second band from nape down over operculum. Ventrals blackish, lighter at base. Membrane between anal spines and anterior rays sometimes dark. Length 375 mm (Description made after specimens from the Red Sea).

Habitat: Ambon ?. — Zululand, Madagascar, Zanzibar, Red Sea, Sokotra, South Arabia, Mauritius, coast of British India.

In sea.

Note. Bleeker (l.c. 1865) mentions this species in a list of fishes recorded from Ambon, but we cannot make out on whose authority. Bleeker did not see specimens himself, for in the Atlas (l.c.) he copies the description of Day. We doubt if this species really occurs in the Indo-australian Archipelago, its eastern range being, as far as we know: Sind.

Doubtful genus and species

A. B. Meyer, Ann. Soc. Españ. Hist. Nat. Madrid XIV, 1885, p. 18 records in a list of fishes collected by him: *Cantharus lineolatus* C.V. from North Celebes. Now this species is a very doubtful one, described by Cuvier & Valenciennes, Hist. Nat. Poissons VI, 1830, p. 244 in a few lines. The chief characteristics are:

D. X. 13. A. III. 13.

Body ovate. Preorbital narrow. Caudal truncate. Brown, lineolated with white. The brown on the body forms small longitudinal interrupted stripes, so as to cover the body with numerous round spots, paler than the stripes. Fins brown, speckled with white. Length "deux pouces".

The authors say that the specimen was found by Péron in the Indian Ocean.

It is very doubtful if the specimen really represents a species of the genus *Cantharus (Spondyliosoma)* as Günther, Cat. Brit. Mus. I, 1859, p. 418 has already remarked. Besides by A. B. Meyer this species seems never to have been quoted again. We are at a loss how Meyer has been able to identify his specimen. Cuvier & Valenciennes based their description apparently on a drawing and as the specimen is very young, it may well be a juvenile stage of some quite different species.

28. Fam. NANDIDAE

Oblong, compressed, head and body covered by ctenoid scales of medium size in regular series, continued on base of soft dorsal, anal and caudal, forming a sheath for the reception of the dorsal and anal spines; lateral line interrupted, by exception absent. Eye lateral in anterior half of head. Two nostrils before eye, both close to it and vertically approximate, or only the posterior close to eye, the anterior somewhat distant. Mouth terminal, small and only moderately protractile or large and very protractile. In the last case the intermaxillary pedicel is long, valid, situated in a deep grove reaching occiput and the gill membranes are not united, which are otherwise broadly united. Six branchiostegals; no pseudobranchiae. Maxillary exposed, no supramaxillary. Opercle with one or two spines, preopercle and preorbital denticulate or entire. Teeth on jaws and palatines in villiform bands; on vomer and parasphenoid villiform or conical or obtusely rounded as also on mesopterygoid. A single dorsal, its spinous part much longer than soft, with XII—XVII strong spines; anal with III—IV strong spines. Pectorals rounded; ventrals below them, rounded with a strong spine; a scaly axillary process present or absent. Caudal rounded with 12—14 branched rays.

Distribution: Freshwater fishes of small or medium size of carnivorous habit, frequenting the streams and lakes, (one species of Nandus even brackish water) of the hills and plains of the Sunda Islands, of India, the Malay Peninsula, Burma and Siam.

Key to the subfamilies of Nandidae

I. Mouth large, very protractile; intermaxillary pedicel long, strong, in a deep groove reaching vertical through hindborder of eye; maxillary terminating below or behind hindborder of eye. Gillmembranes not united, interbranchial membrane slender without scales. Nostrils close together, above each other, both close to eye. 1. *Nandinae* p. 476.

II. Mouth small, moderately protractile; intermaxillary pedicel short, slender, reaching only frontals; maxillary terminating below front border of eye. Gillmembranes broadly united, interbranchial membrane wide, densely scaly. Nostrils horizontally distant, the posterior close to eye. . . . . 2. *Pristolepidinae* p. 478.

1. Subfam. NANDINAE

1. **Nandus** C.V.

(Cuvier & Valenciennes, Hist. Nat. Poissons VII, 1831, p. 481)
Bedula Gray, Illustr. Ind. Zool. II, Pisces 1833, tab. I, fig. 2.

Oblong; body, superior part of head and opercles covered by regularly arranged ctenoid scales of moderate size; lateral line interrupted below middle or posterior part of soft dorsal and continued, some scales below its termination, on caudal peduncle to caudal. Eye lateral, in anterior half of head. Two approximate rounded nostrils close to anterior border of eye, the upper much wider than the lower. Mouth terminal, large, very protractile; the intermaxillary pedicel lying in a groove, reaching behind eye, formed by the bifurcation of the occipital crest. Maxillary exposed, terminating below or behind hindborder of eye, no supramaxillary. Operculum with one spine, preoperculum denticulate or entire. Gillmembranes not united; interbranchial membrane slender, without scales. Six branchiostegals; pseudobranchiae absent. Teeth in jaws in a villiform band; on vomer, parasphenoid and tongue in a slender band. The single dorsal with XIII—XVI spines, the anal with III; pectorals rounded, ventrals acute, without a scaly axillary process; caudal rounded with 11—14 branched rays.

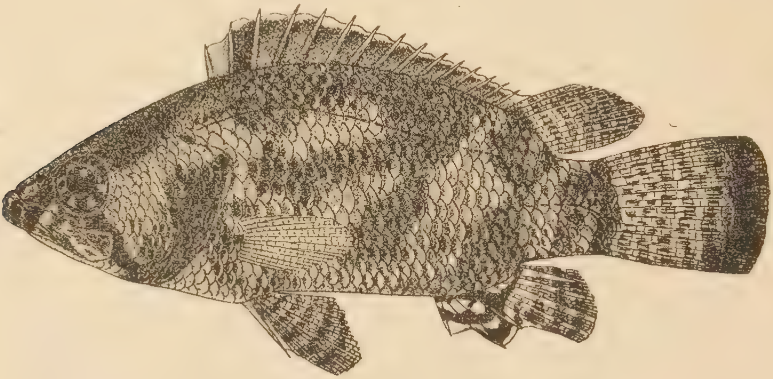

Fig. 94. *Nandus nebulosus* (Gray). × 4/3

Distribution: Freshwater fishes of moderate size inhabiting the rivers and lakes of the Great Sunda Islands and the fresh and brackish water of British India, Burma, Tenasserim and the Malay Peninsula.

1. **Nandus nebulosus** (Gray) (Fig. 94)

Bedula nebulosus Gray, Ill. Indian Zoology II, Pl. 88, Fig. 2, 1830—35.
Nandus marmoratus Cantor, Journ. Asiatic Soc. Bengal XVIII, (1849) 1850, p. 999. (p.p.).
Nandus nebulosus Bleeker, Nat. Tijdsch. Ned. Indië III, (1851) 1852, p. 92.
Nandus nebulosus Günther, Cat. Brit. Mus. III, 1859—61, p. 368.
Nandus nebulosus Bleeker, Arch. Néerl. Sc. Nat. (1873) 1874, p. 458.
Nandus nebulosus v. Martens, Exp. nach Ost-Asien 1876, p. 307.
Nandus nebulosus Bleeker, Atl. ichth. IX, 1877, p. 79.
Nandus nebulosus Vaillant, Nouv. Arch. Mus. Hist. Nat. (4) V, 1893, p. 109. — Bull. Soc. Zool. France XVIII, 1893, p. 59. — Notes Leyden Mus. XXIV, 1902, p. 32.
Nandus borneensis Steindachner, Abh. Senckenb. Nat. Ges. XXV, 1901, p. 422.
Nandus nebulosus Volz, Zool. Jahrb. Abth. Systematik, XIX, 1903, p. 368.
Nandus nebulosus Duncker, Mitt. Naturhist. Mus. Hamburg XXI, 1904, p. 162.
Nandus nebulosus Volz, Revue Suisse Zool. XII, 1904, p. 456.
Nandus nebulosus M. Weber & de Beaufort, in Maass, Durch Zentral-Sumatra II, 1912, p. 18.

D. XIV—XVI, 11—12; A. III, 5—6; L.l. ca. 25 + 9; L.tr. $\begin{array}{c}4-5\\ \hline 1\\ \hline 10\frac{1}{2}-12\frac{1}{2}\end{array}$.

Height 2.5—2.6; head 2.4 in length; eye 3.5 in head, which is pointed, its rostro-frontal profile ascending in a straight line to dorsal slightly convex; interorbital space about $^3/_5$ of diameter of eye, its groove for the reception of the intermaxillary pedicel terminating in vertical through hindborder of eye, the skin of the pedicel without scales. Jaws without scales, the maxillary terminating opposite hindborder of eye. The scaly operculum ending in triangular cutaneous flap, the top of which surpasses the single opercular spine. Villiform teeth in jaws; on vomer, palatines, pterygoids and tongue in slender villiform bands. Dorsal with the third to fifth spine highest, the sequent gradually decreasing, the last shorter than half height of first ray. Soft dorsal rounded, soft anal somewhat acute; anal spines strong, the second highest and strongest, curved, equal eye or slightly longer. Pectorals and anals shorter than head without snout. Brownish, on trunk with darker irregular marmorated transverse bands, similar but smaller bands on head, partly radiating from eye; soft median fins, caudal and ventrals with transverse series of spots; pectorals and dorsal membrane fuscuous.

Length 135 mm.

Nomen indig.: Temburut (Djambi).

Habitat: Singapore; Biliton; Banka; Sumatra (Lahat, Indragiri, Danau Sialang, Taluk!, Gunung Sahilan!; Sungei Mahe, Laut Tador, Latong, Kwantan river, Djambi!); Borneo (Pamangkat, Bankayan, Danu Sriang, Rivers Kapuas, Sebruang, Baram, Pontianak, Raun, Sibau); not known from Java; in rivers and lakes.

2. Subfam. PRISTOLEPIDINAE

1. **Pristolepis** Jerdon

(Jerdon, Madras Journ. Lit. and Sci. XV, 1848, p. 141. type *P. marginatus* (Jerdon)).

Catopra Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 65.
Paranandus Day, Fishes of Malabar 1865, p. 130.

Oblong, head and body covered by regularly arranged ctenoid scales of moderate to large size, lateral line interrupted below termination of dorsal fin and continued about two scales below it on caudal peduncle and base of caudal. Eye lateral in anterior half of head. Two horizontally distant nostrils before eye, the posterior close to eye, the anterior with a valve. Mouth terminal, small, slightly protractile, the intermaxillary pedicel short, slender, reaching frontals; maxillary terminating below frontborder of eye, exposed, no supramaxillary. Opercle with two flat spines, preopercle mostly serrate, preorbital mostly

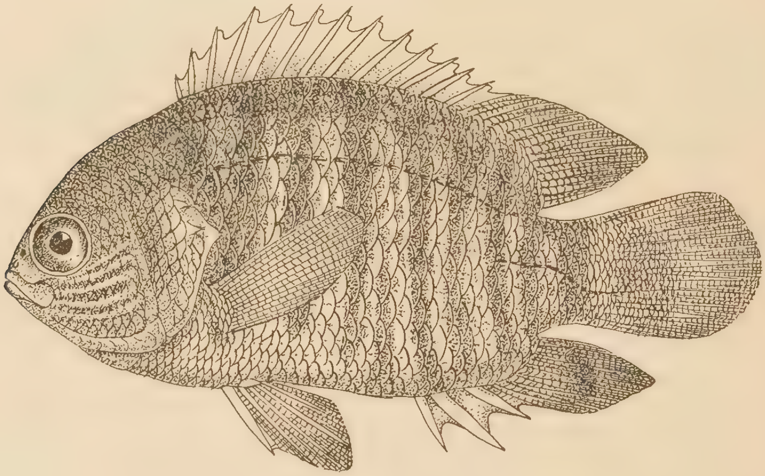

Fig. 95. *Pristolepis fasciatus* (Blkr.) ×2/3.

finely denticulate. Gillmembranes broadly united, interbranchial membrane wide, densely scaly. Six branchiostegals, pseudobranchiae absent. Teeth on jaws and palatines in villiform bands, villiform or globular on vomer, obtusely globular on base of tongue, on presphenoid and sometimes on vomer. The single dorsal with XII—XVI, 11—16; anal III—IV, 8—9; pectorals rounded, ventrals somewhat acute with a scaly axillary process, caudal rounded with 12 branched rays.

Distribution: Freshwater fishes of moderate size, inhabiting the rivers and lakes of the Sunda Islands of the planes and hills of Malabar, Burma, Siam and Cochinchina.

Key to the indo-australian species of Pristolepis

1. Lateral line separated by 4½ scales from median dorsal spines; ventrals reaching anus . . . . . . 1. *P. fasciatus* p. 479.
2. Lateral line separated by 3½ scales from median dorsal spines; ventrals not reaching anus . . . 2. *P. grooti* p. 480.

1. **Pristolepis fasciatus** (Blkr.) (Fig. 95)

Catopra fasciata Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, pp. 60, 65.
Catopra nandoides Bleeker, loc. cit. pp. 61, 172. — Act. Soc. Sc. Indo-Neerl. VIII, 1860, Sumatra VIII, p. 35.
Catopra fasciata Günther, Cat. Brit. Mus. III, 1859—1861, p. 368.
Catopra nandoides Günther, ibidem.
Catopra siamensis Günther, Proc. Zool. Soc. London 1862, p. 191.
Catopra fasciata Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 173.
Catopra nandioides Day, Proc. Zool. Soc. London, 1865, p. 615.
Catopra siamensis Peters, Monatsber. Akad. Berlin (1868) 1869, p. 257.
Catopra fasciata Bleeker, Arch. Néerl. Sc. Nat. IX, (1873) 1874, p. 461.
Catopra nandoides v. Martens, Exp. Ost-Asien, Zool. 1876, p. 307.
Catopra fasciata v. Martens, ibidem.
Pristolepis fasciatus Bleeker, Atl. ichth. IX, 1877, p. 80.
Catopra fasciata Sauvage, Bull. Soc. Philom. (7) VII, 1883, p. 151.
Catopra nandoides Sauvage, ibidem.
Catopra fasciata Sauvage, Bull. Soc. Zool. France IX, 1884, p. 218.
Pristolepis fasciatus Day, Fish. India 4°, 1878—1888, p. 131. — Fish. Brit. India II, 1889, p. 85.
Pristolepis fasciata Vinciguerra, Pesci di Birmania 1890, p. 167.
Pristolepis fasciatus Vaillant, Bull. Soc. Zool. France XVIII, 1893, p. 59, — Notes Leyden Mus. XXIV, 1902 p. 32. — Nouv. Arch. Mus. Hist. Nat. (4) V 1893, p. 109.
Catopra nandoides Volz, Zool. Jahrb. Systematik XIX, 1903, p. 369.
Catopra nandoides Volz, Revue Suisse Zool. XII, 1904, p. 456.
Catopra fasciata Volz, l.c. p. 457.
Catopra fasciata Duncker, Mitth. Naturh. Mus. Hamburg XXI, 1904, p. 162.

Catopra fasciata M. Weber & de Beaufort in Maass, Durch Zentral Sumatra, II, 1912, p. 18.
Pristolepis fasciata Hora, Journ. Nat. Hist. Soc. Siam VI, 1923, p. 177. — Mem. Asiat. Soc. Bengal VI, 1924, p. 489.
Catopra fasciata Vinciguerra, Ann. Mus. Civ. Genova (3a) X (L) 1926, p. 586.
Pristolepis fasciatus Chevey, Invent. Faune ichth. Indochine, 19e note, 1932, p. 22.

D. XIII—XIV, 14—16; A. III, 8—9; L.l. 20—22 + 9—12; Ltr. $\begin{array}{c}4\frac{1}{2}\\\hline 1\\\hline 10\end{array}$.

Rostro-dorsal profile straight to front with a slight concavity above eye, thence convex. Height twice, head about 2,6 in length. Eye 4—4.4 in head, slightly less than convex interorbital space and than snout. Maxilla terminates below or somewhat behind frontborder of eye. Preorbital finely denticulate. Fourth, fifth and sixth dorsal spines strongest and highest, somewhat less than twice length of head without snout. Pectorals about equal to length from end of opercle to posterior nostril; ventrals shorter, reaching anus. Fuscous-olivaceous, lighter below, sides of body with more or less than ten irregular transverse darker bands; more pronounced in young as also three to five whitish bands following the longitudinal series of scales on cheeks. For other characters see those of the genus. Length 210 mm.

Nomen indig.: Katoprak (Malay, Batavia), Sengat (Sumatra).

Habitat: Banka; Java; Sumatra (Palembang!, Telokbetong, Benkulen, Lahat, Sungei Mahe, Kuala Lumpur, Kuala Sernantan, Gunung Sahilan!, Sukadana!, Taluk!); Borneo (Montrado, Pamangkat, Benkayan, Bandjermasin, Pengaron, Sintang, Danau Sriang, Sinkawang, Mandhor, Knapei river, Sebruang river, Kapuas river!, Lundu river, Kutei!, Sibau!), — Perak, Siam, Burma, Cochinchina; in freshwater.

2. **Pristolepis grooti** (Blkr.)

Catopra grootii Bleeker, Nat. Tijdschr. Ned. Indië III, (1851), 1852, p. 90.
Catopra grootii Günther, Cat. Brit. Mus. III, 1859—61, p. 369.
Catopra grootii Bleeker, Arch. Néerl. Sc. Nat. IX, (1873) 1874, p. 464.
Catopra grooti v. Martens, Exped. Ost-Asien, Zool. 1876, p. 307.
Pristolepis grootii Bleeker, Atl. icht. IX, 1877, p. 80.
Catopra grootii Boulenger, Proc. Zool. Soc. London 1890, p. 38.
Catopra grooti Volz, Revue Suisse Zool. XII, 1904, p. 457.
Catopra grootii M. Weber & de Beaufort in Maass, Durch Zentral Sumatra II, 1912, p. 18.

D. XII—XIII, 16; A. III, 8—9; L.l. 19—21 + 10—14; L.tr. $\begin{array}{c}3\frac{1}{2}\\ \hline 1\\ \hline 10\end{array}$.

Rostro-dorsal profile convex; height twice, head about 2.8 in length. Eye more than 4 in head, its diameter less than interorbital space and slightly less than snout. Maxilla terminates slightly behind frontborder of eye. Fourth, fifth and sixth dorsal spines highest and strongest, twice in head without snout. Pectorals shorter than head; ventrals much shorter, not reaching anus. Fuscous-olivaceous, lighter below; of the about eight to ten diffuse darker transverse bands only the posterior ones are visible in the adult; the longitudinal bands on the cheeks of the preceding species seem to be wanting. Length 184 mm.

Habitat: Banka; Biliton; Sumatra (Djambi!, Deli, Sungei Mahe, Danau Kuta, Indragiri, Taluk!, Batang Hari!, Ringgat!,); Borneo (Danau Sriang).

Note: This species differs from the very nearly related *Pr. fasciatus* by a more convex rostro-dorsal profile, by the length of the ventrals which do not reach anus, by a difference in the colouration, but principally by the lateral line which is separated from the median dorsal spines by only 3½ scales: differences which are visible also in young specimens of 65 mm and less.

29. Fam. SCIAENIDAE

Oblong to more or less elongate, compressed, covered with rather thin adherent cycloid or chiefly ciliate scales, more or less extending on median fins; lateral line complete, continued on caudal, more or less arched, sensory tubes distally bifid or fan-like branched. Head covered with scales; the superficial bones with more or less developed muciferous vacuosities; snout often, chin usually with muciferous pores, sometimes a maxillary symphysial barbel or barbels. Eyes lateral, anterior. Two approximate nostrils on each side, close to eye. In indo-pacific species the mouth protractile, large, terminal, oblique, jaws equal, subequal or the lower prominent (*Otolithinae*); or the mouth less protractile, small or moderate, inferior, horizontal or nearly so; lower jaw shorter, inclosed. In the latter case (*Sciaeninae*) snout bluntly rounded, with pores on top, level with frontborder of intermaxillaries or overhanging them and prominent. Maxillary without supramaxillary; its upper border alone or nearly entirely concealed under the preorbital and first suborbital, its end distally expanded. Preopercle usually crenulate or denticulate often becoming entire with age, opercle with two flat non-pungent spines. Teeth in jaws in a villiform broad or narrow band and an outer or inner row of conical distant or close-set, often enlarged teeth which may in *Otolithinae* become caninoid or true canines in a restricted number. In *Sciaeninae* no enlarged mandibulary teeth. No teeth on vomer, palatines and tongue. Gillmembranes separate, free from isthmus; four gills, a slit behind the fourth. Pseudobranchiae usually large; gillrakers present. Dorsal more or less deeply notched or incised[1]; the

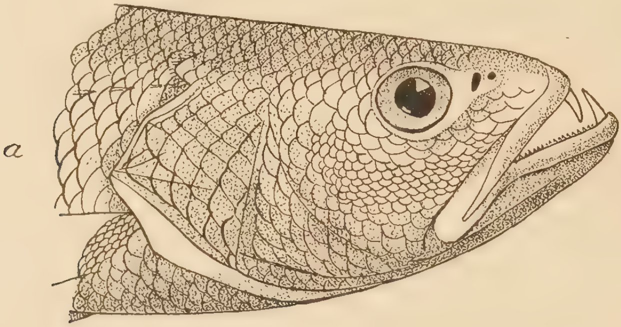

Fig. 96. Side view of head of *Otolithes argenteus* (C.V.) to show the prominent lower jaw and the position of the canines in the terminal mouth.

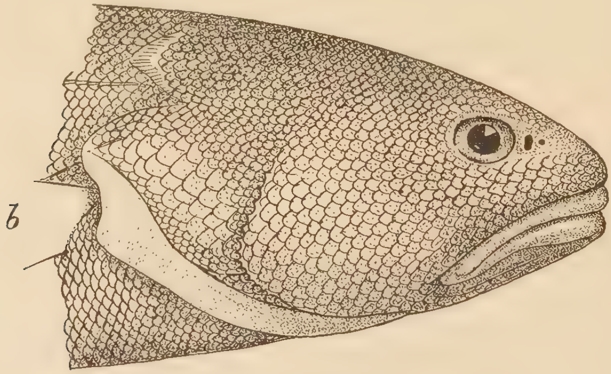

Fig. 97. Side view of head of *Otolithoides microdon* (Blkr.) to show the terminal mouth and subequal oblique jaws.

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[1] Not notched in *Pama perarmata.*

spinous part, sometimes depressible in a scaly groove, shorter than soft dorsal. Anal usually, in indo-pacific species always, much shorter than soft dorsal, with one, generally with two spines, the second the largest. Ventrals thoracic I, 5, below or behind base of pectorals, with or without a scaly axillary process. Caudal rounded or often wedge-shaped. Air-bladder usually large and complicated. Subocular shelf, when present, a small and usually slender process of second suborbital. Vertebrae 24 to 30. Post-temporal entire, crenulate, ciliate or fimbriate.

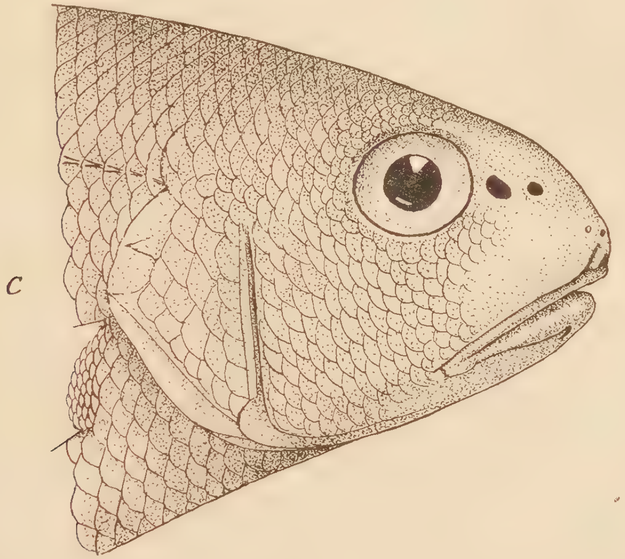

Fig. 98. Side view of head of *Johnius belengeri* (C.V.) to show the inferior mouth (compare Fig. 99 on p. 486) and the convex lobate snout (compare Fig. 105 on p. 534).

Distribution: Carnivorous fishes living in tropical and temperate seas on sandy coasts, avoiding deep water and rocky bottom, many also in brackish water of mouth of rivers to tidal reach, while a few in the tropics are more or less confined to fresh water. Many of them attain a large size and are valued as food fish; the air-bladder of some is used for preparing isinglass.

Note: The two types of structure of mouth-parts, mentioned above, seem to correspond with an ecological difference in habitat and feeding. Probably the *terminal*, wide, oblique mouth, usually armed with enlarged teeth or caninoids or large canines of the *Otolithinae,* indicates the hunting of prey in superficial water, at least at some distance above the bottom, contrary to the *inferior,* more or less horizontal mouth of the *Sciaeninae,* lacking canines, with short, included lower jaw, without enlarged teeth (Fig. 100), and in some with a symphysial barbel, which adapt them to feeding on the bottom.

The *Sciaenidae* in general are renowned for the faculty to produce sounds by the rapid vibration of a special muscle first described by Sörensen [1]), directly attached to the air-bladder or its neighborhood, whereby the bladder operates as a resonator; the sounds being used in sexual intercourse. The *Sciaenidae* are therefrom popularly known as Drums or Grunters. The air-bladder, in many species of a complicated structure, is used for the preparation of isinglass.

Key to the Genera of indo-australian Sciaenidae

I. Mouth terminal, snout more or less pointed, in one genus short and convex, intermaxillaries forming frontborder of mouth; cleft of mouth oblique; jaws equal, subequal or the lower conspicuously prominent; canine teeth present. (*Otolithinae*).

  1. Head pointed, snout depressed, none or three pores on top. Lower jaw prominent without symphysial pores; intermaxillary teeth conical, enlarged, close-set or distant, an inner uni- or pluriseriat villiform series; in mandibulary an outer series of close-set or distant conical ones, occasionally an inner villiform series; anteriorly in both jaws or merely in upper 2 to 4 canines. Dorsal IX—XI, I, 24—31. . 1. *Otolithes* p. 487.

  2. Head bluntly pointed, in one genus snout short, convex; small pores on top. Jaws subequal or the lower slightly the shorter. Teeth in jaws in an uni- or pluriseriate villiform series, an upper outer and a lower inner of close-set or distant conical enlarged ones, anteriorly or laterally 2 may be canine-like.

    a. Head ovoid, somewhat inflated, snout short and convex. Body tapering into a compressed tail. Sensory scales enlarged and in raised lateral line. Dorsal VI—X, I, 40—43. Close-set series of small sharp teeth in jaws, with an upper outer and a lower inner row of small, curved, far distant canines of unequal size. No pores at mandibular symphysis. . . . . 2. *Pama* p. 495.

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[1]) Sörensen, W. Om Lydorganer hos Fiske, Kjøbenhavn 1884.

b. Oblong to elongate, head bluntly pointed. Sensory scales of lateral line thickly covered with minute scales. Dorsal X—XI, I, 27—34. Intermaxillary teeth in one or two villiform series, externally a row of distant conical, sometimes curved teeth, two anterior or lateral ones canine-like; mandibulary teeth in an inner row of close-set or distant ones, one near symphysis may be caninoid, externally a villiform series. No pores at mandibular symphysis. . . . . . . 3. *Otolithoides* p. 499.

c. Oblong compressed, head with convex snout, not prominent before mouth. Jaws equal or upper slightly overlapping. Sensory scales of lateral line usual, the sensory tubes fan-shaped branched to bifid. Dorsal IX—X, I, 22—34. Teeth in villiform series in both jaws; the outer series in intermaxillaries conspicuously enlarged, the anterior occasionally canine-like, in mandibularies the inner series enlarged, unequal, distant, the anterior shortest. (Fig. 102). Usually five pores below mandibular symphysis . . . . 4. *Pseudosciaena p. 505.*

II. Mouth inferior, snout bluntly rounded or inflated, its top more or less prominent before intermaxillaries. (Fig. 99). Cleft of mouth more or less horizontal. Upper jaw much protractile, overlapping lower which is included and has five pores below mandibular symphysis. Snout generally with pores on top, its free border entire or lobate. Teeth in villiform bands in both jaws, subequal in mandibularies, in intermaxillaries the outer series enlarged, no true canines or caninoids. With or without a mental barbel 1). (*Sciaeninae*).

1. No barbel at mandibular symphysis. Obtuse snout more or less prominent before mouth. Dorsal VIII—X, I, 22—34. . . . . 5. *Johnius* p. 526.

2. A barbel at mandibular symphysis, with a wide pore at its base. Obtuse snout prominent before mouth. Dorsal IX—XII, I, 22—31. 6. *Sciaena* p. 541.

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1) This is an artificial distinctive character as the presence or absence of a mental barbel is not without transition, as already Bleeker stated, who already doubted the validity of the separation of the two genera. Day described, (probably in an old example) of *Johnius coibor* (Ham. Buch.), a short barbel between central and lateral mental pore.

Note: From a taxonomic point of view the promiscuous use of generic names adds to the difficulties of arrangement and synonymy of the *Sciaenidae*, already complex enough by the difficulty to discriminate the species. F. i. in their review of Sciaenoid fishes of Japan (1911) Jordan & Thompson enumerate under the genus *Sciaena* (Artedi) Linnaeus no less than 15 synonyms. They say in their diagnosis about the teeth "in the two or more series, the upper" (must be the "outer") series above enlarged and sometimes the inner below, no true canines". In 1917 Jordan & Starks write (Ann. Carnegie Mus. XI, p. 452) "We retain the generic name Bola Ham. Buch. for the Asiatic species of Sciaena, but in which the inner teeth of the lower jaw are enlarged". Fowler (Bull. U. S. Nat. Mus. XII, 1933, p. 371) does not accept Jordan & Thompson's conclusions to the nomenclature of the genus *Sciaena* and says *"Bola* Ham. Buch. can not be admitted as a Sciaenid as its tautonymic genotype *Cyprinus bola*, is a Cyprinid".

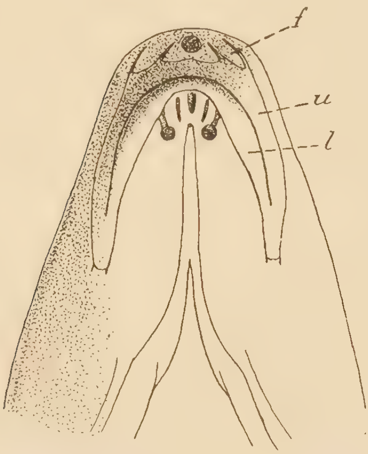

Fig. 99. Lower surface of head of *Johnius belengeri* (C.V.) to show the inferior month. f quadrilobate free border of snout; l lower jaw with five mental pores; u upper overlapping jaw.

We are of opinion that, at least for the indo-australian species, the strict application of the above indicated distribution in the two ecological different groups of *Otolithinae* and *Sciaeninae* will facilitate the generic arrangement,where by the present use of the extensive, badly confined genus *Johnius* will be divided in *Pseudosciaena*, belonging to the *Otolithinae* and *Johnius* s. str. belonging to the *Sciaeninae*. As to the use of the name *Pseudosciaena*, that genus was based by Bleeker (Ned. Tijdschr. Dierk. I, 1863, p. 142) on what he later (Versl. Akad. Amsterdam (2) IV 1870, p. 251) and still later, with a query (Ned. Tijdschr. Dierk. IV 1873, p. 142) named *Corvina amblyceps* Blkr. Erroneously he designated (Arch. Néerl. Sc. Nat. XI 1875, p. 329) *Sciaena aquila* Risso as the type, an assertion which was repeated by Jordan & Evermann (Fish. North & Middle America II, 1898, p. 1393) but corrected by Jordan

(Genera Fishes III, 1919, p. 321) and by Fowler (Bull. U. S. Nat. Mus. XII, 1933, p. 368). The same series of errors was repeated by Chaudhuri (Mem. Indian Mus. V, 1923, p. 724), who wrote "Bleeker proposed to separate those species which had enlarged teeth in the lower jaw from *Sciaena* and wanted to group them under a new genus *Pseudosciaena*, for which he made *S. aquila* (Lac.) the type. If Bleeker's arrangement be adopted the generic name of the group should by reason of priority become Argyrosomus of de la Pylaie, who formed the latter genus in 1832 on the same species". We believe to have shown, that *Pseudosciaena* is therefore not antedated by *Argyrosomus* de la Pylaie (1833), which was truly formed on *Sciaena aquila* Cuvier and that *Pseudosciaena* may be used as we have done.

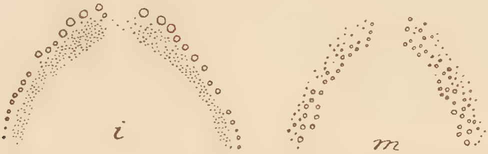

Fig. 100. Dentition of *Sciaena dussumieri* (C.V.) i intermaxillary, m mandibulary teeth.

In the rather difficult counting of scales we have followed Bleeker in counting the linea transversalis between the spinous dorsal and the base of the ventrals.

1. **Otolithes** (Cuvier) Oken. (Fig. 96, p. 482)

(Cuvier, Règne Anim. II 1817, p. 299 "Les Otolithes". — Otolithes Oken, Isis 1817)

Otolithus Cuvier, Règne Anim. ed. 2. II 1829, p. 172.

Oblong to elongate, head pointed, snout depressed. Scales moderate to small, ciliate or cycloid; lateral line slightly arched anteriorly, not squamulate, continued on caudal, sensory tubes bifid or arborescent. Eye in anterior half of head. Two approximate nostrils, the posterior oval, close to eye. Mouth terminal, wide, the jaws very wide, the lower conspicuously prominent, maxillary distally only partly concealed and expanded under suborbital. No barbels, symphysial pores present or absent, no pores on snout or three small ones. Preopercle entire or weakly denticulate, opercle with two non pungent, flat spines, posttemporal entire or crenulate. Six branchiostegals; pseudobranchiae present. Teeth in upper jaw an inner villiform series, broadening posteriorly; externally a row of close-set conical ones, anteriorly one or two strong curved canines on each side; in lower jaw a strong curved canine on each side, behind them a series of distant unequal conical teeth, inside of them a few smaller ones; none on vomer, palatines and tongue. Dorsal deeply notched, the spinous part with IX to XI slender spines, the soft with 24 to 31 rays; anal with a first minute and a second longer spine, shorter than the 7 to 12 rays. Caudal rounded or rhomboid with 15 principal rays.

Distribution: Indo-pacific fishes attaining a large size, reaching to China and Japan, living in sea and brackish water of mouth of rivers, some also in fresh water above tidal reach. Valued as food; the airbladder used for insinglass.

Key to the indo-australian species of Otolithes

I. Anal with 7—8 rays, its base 4 to 4½ in that of soft dorsal; without dark blotches.
  1. 24—27 dorsal rays; L.l. 60; origin of anal before middle of soft dorsal . . . . . . 1. *O. lateoides* p. 488.
  2. 28—30 dorsal rays; L.l. 50—54; origin of anal behind middle of soft dorsal; brownish red 2. *O. ruber* p. 490.
  3. 27—30 dorsal rays; L.l. ca 50; origin of anal behind middle of soft dorsal opposite 17. ray; silvery . . . . 3. *O. argenteus* p. 492.

II. Anal with 10—12 rays; its base 2½ to 3 in that of soft dorsal; with dark blotches on back and sides; 30 dorsal rays; L.l. ca 85; origin of anal behind middle of soft dorsal . . . . 4. *O. maculatus* p. 493.

1. **Otolithes lateoides** Blkr.

Otolithus lateoides Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3) II, 1845, p. 523. — Verh. Batav. Gen. XXIII 1850, p. 16. — Nat. Tijdschr. Ned. Indië I 1850, p. 98.

? *Otolithus versicolor* (C.V.) Cantor, Cat. Malayan Fish. 1850, p. 1045.

Otolithus argenteus Bleeker, Nat. Tijdschr. Ned. Indië XV, 1858, p. 375 (nec C.V. see Günther, Cat. Brit. Mus. II 1860, p. 311).

Otolithus lateoides Günther, Cat. Brit. Mus. II, 1860, p. 311.

Otolithus lateoides Bleeker, Verh. Akad. Amsterdam XIV, (1873) 1874, Mém. Sciénoides p. 7. — Atl. ichth. IX 1877. Tab. 384, fig. 1.

? *Otolithus versicolor* Duncker, Mitth. Naturh. Mus. Hamburg XXI, 1904. p. 154.

Otolithus dolorosus Seale, Philippine Journ. Sci. V, 1910, p. 250.

Otolithes lateoides Vinciguerra, Ann. Mus. Civ. Genova (3) X, 1926, p. 582.

Otolithes versicolor Fowler, Bull. U.S. Nat. Mus. XII, 1933, p. 354.

D. X, I, 24—27; A. II, 7; L.l. 60; L.tr. $\begin{array}{c}11\\\hline 1\\\hline 18\end{array}$.

Elongate, rostro-dorsal profile ascending in a nearly straight line to spinous dorsal where the back is arched, thence descending in a straight line to caudal peduncle, ventral profile slightly convex. Height 4 to 4.4 in length, head pointed 3.7 to 4 in length. Eye situated in anterior half of head, its lower margin below horizontal through commencement of gape of mouth, 4.6 to 5.6 in head, about equal to flat interorbital space and equal to or somewhat shorter than pointed snout which has no pores. Mouth terminal, strongly oblique; upper jaw reaching about middle of eye; maxillary concealed, its distal expansion truncate, about equal eye; lower jaw prominent, on both sides below symphysis two small pores. Preopercle rounded, slightly denticulate, opercle with two non-pungent spines, posttemporal fimbriate. Intermaxillaries with a bi-to triseriate inner band of small close-set teeth and an outer series of middle-sized distant ones, anteriorly with one to two canines, the posterior the longest; mandibularies with a single series of unequal, distant conical teeth, one of the anterior a canine. Scales on head and below pectorals to ventrals cycloid, otherwise ciliate; lateral line slightly arched to above anal, the sensory scales strongly branched distally. Spinous dorsal near to base incised, triangular, its base nearly twice in that of rayed dorsal; the spines flexible, the third and fourth highest, nearly equal postocular part of head; rays somewhat lower. Origin of anal below eighth dorsal ray, the second spine rather weak, about half length of first ray. Pectorals acutely rounded, nearly equal to or somewhat shorter than head without snout, ventrals pointed, subequal to pectorals. Caudal wedge-shaped, the median rays prolonged; least height of its peduncle nearly twice diameter of eye. More or less greyish above, below and on sides silvery, fins yellowish hyaline.

Length up to 520 mm. [Specimen of Bleeker's collection in the Leiden Museum seen by us].

Nomen indig: Gigi-djarang (Malay, Java).

Habitat: Pinang; Java (Batavia!); Borneo (Serawak *O. dolorosus* Seale).

Note: Fowler, the latest author on indo-pacific *Sciaenidae,* calls the species *versicolor* after the insufficient short diagnosis of Cuvier (Règne Animal ed. 2, 1829, p. 173), copied in Cuvier & Valenciennes (Hist. Nat. Poiss. V, 1830,

p. 64) and based on Russell's figure (Fishes of Coromandel II, 1803, pl. 109) of a fish from Coromandel, called Pottee Kanasah. Cantor, supposing that he had refound the species in a single example from Pinang of $6^1/_8$ inch, gave an incomplete diagnosis of it and named it *versicolor* C.V. with a query, as he was dubious about its identity. We found in the Leiden Museum a very young individual of an *Otolithes* of 127 mm length, the caudal of which occupied 37 mm with its very long middle rays. It agrees with Cantor's specimen, as it has the membrane of the spinous dorsal and marginal half of the soft dorsal, of the anal and caudal minutely dotted with black, on the latter fin so closely as to produce a general blackish colour. We count 26 dorsal rays, in anal II, 7. The origin of that fin has the same anterior position before the middle of soft dorsal as *lateoides* has. We conclude therefore that it is the young of that species even as Cantor's individual. Günther placed *versicolor* in his list of doubtful species and added in a note: "A single skin of a young specimen of Dr. Cantor's collection, is in the British Museum" (certainly that above named) "but it does not present pecularities by which the species may be properly distinguished". Also Bleeker was in doubt and observes "S'il venait d'être prouvé que le lateoides habite aussi la côte de Coromandel il serait probable que le Pottee Kanasah soit de la même espèce et en ce cas le lateoides devait reprendre, par droit de priorité, le nom de versicolor". But as neither Day nor any other author on Indian fishes has neither *versicolor* nor *lateoides* reported in India, it is therefore safer not to use the dubious name of *versicolor*.

We are not sure that *O. dolorosus* Seale from Sandakan, Borneo, belongs to the present species. It differs by a less number of scales in lateral line, 54 against 60 in *lateoides* and by more or less distinct narrow black lines following the row of scales above the lateral line. Only one specimen of 300 mm length seems to be known.

2. **Otolithes ruber** (Bloch, Schneider)

Johnius ruber Bloch, Schneider, Syst. ichth. 1801, p. 75.
Otolithus ruber Cuvier & Valenciennes, Hist. Nat. Poiss. V, 1830, p 60.
Otolithus ruber Cantor, Cat. Malayan Fish. 1850, p. 1041.
Otolithus ruber Bleeker, Nat. Tijdschr. Ned. Indië III, (1851) 1852, p. 56.
Otolithus ruber Günther, Cat. Brit. Mus. II, 1860, p. 395.
Otolithus submaculatus Blyth, Journ. Asiat. Soc. Bengal XXIX (1860) 1861, p. 141.

Otolithus ruber Day, Fishes Malabar 1865, p. 19.
Otolithus submaculatus, Day, Proc. Zool. Soc. London 1869, p. 516.
Otolithus ruber Bleeker, Verh. Akad. Amsterdam XIV (1873) 1874, Mém. Sciénoides p. 11.
Otolithus ruber Day, Fishes India 4° 1878—1888, p. 196. — Fish. Brit. India II, 1889, p. 128.
Otolithus ruber Duncker, Mitth. Naturh. Mus. Hamburg XXI, 1904, p. 154.
Otolithus ruber Gilchrist & Thompson, Ann. S. African Mus. VI, 1908, p. 184.
Otolithus ruber Zugmayer, Abh. Bayer. Akad. XXVI, 1913, p. 19.
Otolithes ruber Jordan & Starks, Ann. Carnegie Mus. XI, 1917, p. 452.
Otolithus ruber Barnard, Ann. S. African Mus. XXI, 1925—1927, p. 573.
Otolithes ruber Fowler, Proc. Acad. N. Sc. Philadelphia 1927, p. 285. — Journ. Bombay N. Hist. Soc. XXXIII 1929, p. 115. — Bull. U.S. Nat. Mus. XII, 1933, p. 356.

D. X, I, 28—30; A. II, 7; Ll. 50—54; Ltr. $\frac{7}{17}$.

Elongate; height 3.50 to 4.50; head 3.50 to more than 4 in length. Eye situated in anterior half of head, 4—6 in head, 1 to 1.50 in snout and flat interorbital space. Mouth oblique, upper jaw reaches posterior third of eye, maxillary concealed. Teeth on either side of symphysis of upper jaw a pair of large canines, an inner villiform band and a row of outer teeth conically curved, occasionally even between the canines; in the lower jaw a central (sometimes a second) curved canine with a few villiform teeth behind it, and a lateral row of distantly placed conical teeth. Preopercle serrulate to scarcely denticulated, opercle with two flat spines, posttemporal crenulate. Scales ciliate; lateral line slightly arched, sensory tubes distally arborescent. Base of spinous dorsal more than twice in that of soft dorsal, both deeply incised, the spines slender, second and third highest, half or somewhat more of height of body and half or more higher than rays. Anal originating somewhat behind middle of soft dorsal, rounded, second spine rather weak $^2/_5$ length of first ray. Pectorals equal to head without snout, ventrals do not reach quite halfway to the vent. Caudal wedge-shaped in young, getting rounded or even truncate with age. Brownish red, shot with silvery and white, sometimes glossed with gold in lower third of body; first dorsal stained black at its edge, soft dorsal and anal with greyish outer margin; pectorals, ventrals and anal yellow. Length up to 750 mm. [Not seen by us].

Habitat: Singapore; Pinang: — British India, Ceylon, Malay Peninsula, Belutschistan, Coast of Natal, Delagoa Bay.

3. **Otolithes argenteus** (C.V.) (Fig. 96, p. 482)

Otolithus argenteus Cuvier & Valenciennes, Hist. Nat. Poiss. V, 1830, p. 62.
Otolithus argenteus Bleeker, Nat. & Geneesk. Arch. N. I. (3) II, 1845, p. 522.
Otolithus argenteus Richardson, Ichth. China, Japan Brit. Ass. 1846, p. 225.
Otolithus argenteus Bleeker, Journ. Ind. Arch. III (1848) 1849, p. 66. — Verh. Bat. Gen. XXIII (1849) 1850, Sciaenoid. p. 15.
Otolithus argenteus Cantor, Cat. Malayan Fish. 1850, p. 1043.
Otolithus argenteus Rüppell, Samml. Senckenberg. Mus. 1852, p. 8.
Otolithus argenteus Peters, Monatsber. Acad. Berlin 1855, p. 434.
Otolithus argenteus Günther, Cat. Brit. Mus. II, 1860, p. 310.
Otolithus argenteus Kner, Novara-Exp. Fische 1865, p. 135.
Otolithus argenteus Playfair, Fish. Zanzibar 1866, p. 53.
Otolithus argenteus Bleeker, Verh. Akad. Amsterdam XIV (1873) 1874, Sciénoides p. 9. — Enumération Poiss. Madagascar 1875, p. 104. — Atl. ichth. IX, 1877, Tab. 385, fig. 5.
Otolithus argenteus v. Martens, Preuss. Exp. Ost-Asien 1876, pp. 209, 210.
Otolithus argenteus Day, Fish. India 4° 1878—1888, p. 197. — Fish. Brit. India II 1889, p. 129.
Otolithus argenteus Sauvage, Poiss. Madagascar 1891, p. 520.
Otolithus argenteus Duncker, Mitth. Nat. Mus. Hamburg XXI, 1904, p. 154.
Otolithus argenteus Fowler, Journ. Acad. Nat. Sci. Philadelphia (2) XII, 1904, p. 530.
Otolithus argenteus Pellegrin, Bull. Soc. Zool. France XIII, 1905, p. 84.
Otolithus argenteus Evermann & Seale, Bull. Bur. Fish. XXVI, 1906, p. 87.
Otolithus orientalis Seale, Philippine Journ. Sci. V, 1910, p. 281.
Otolithus argenteus Bean & Weed, Proc. U. S. Nat. Mus. XLII 1912, p. 606.
Otolithus argenteus Zugmayer, Abh. Bayer. Akad. Wiss. XXVI, 1913, p. 19.
Otolithes argenteus Jordan & Starks, Ann. Carnegie Mus. XI, 1917, p. 452.
Otolithus argenteus Ogilby, Mem. Queensland Mus. VI, 1918, p. 63.
Otolithus argenteus Pillay, Journ. Bombay N. Hist. Soc. XXXIII, 1929, p. 366.
Otolithes argenteus Herre, Notes Fish. Zool. Mus. Stanford Univers. 1931, p. 57.
Otolithes argenteus Fowler, Proc. Acad. Nat. Sci. Philadelphia (1931) 1932, p. 446. — Bull. U. S. Nat. Mus. XII, 1933, p. 355.
Otolithus argenteus F. S. G. Lin, Bull. Chekiang Prov. Fish. Station 1, 1935, p. 5.

D. X, I, 27—31; A. II, 7; Ll. about 50; Ltr. $\frac{7—8}{10—12}$.

Elongate, rather slender, height 4—4.5; head bluntly pointed, its profile slightly ascending, somewhat more or less than 3.5 in length. Eye 4—5 in head, 1.4 in snout and somewhat less than almost flat interorbital space. Snout about 3.5 in head, without pores. Posterior nostril oval, close to eye, the approximate anterior nostril rounded, smaller. Mouth oblique, upper jaw reaching middle of pupil, maxillary with the upper border concealed below suborbital, hindborder free, round; lower jaw prominent. Preoperculum almost entire, operculum with two non-pungent spines. Teeth in upper jaw in a villiform band, broadening posteriorly, anteriorly continued in a single short row of minute teeth, outside of them a complete single series of close-set conical teeth, on each side near symphysis one or two strong, curved long canines; the outer the longest; in mandible on each side a strong curved symphysial canine, both playing between the two upper ones, behind them a single series of close-set conical ones, inside of them a few smaller ones. Scales in adult cycloid in young ciliate; on head, before ventrals and on lower half of tail, also in adult, more or less ciliate. Spinous dorsal about half length of soft, the spines increasing in length to third and fourth, which equal about half height of body and are about one third higher than the rays. Base of anal nearly one fifth of that of soft dorsal, its origin opposite about 12th dorsal ray, its spines slender, weak, the second almost thrice in head. Caudal cuneiform, in young lanceolate, least height of its short peduncle somewhat longer than diameter of eye. Silvery, darker along back, a dark blotch on opercle, fins yellowish, border of dorsal dusky. Length up to 500 mm. [Specimen of Bleeker's collection in Amsterdam Museum seen by us].

Nomen indig: Gigi-djarang, Tètèt, (Malay, Batavia), Melontok, Tigowodjo, Klotok (Javanese), Grabak (Sundanese), Keronker (Madura).

Habitat: Singapore; Pinang; Banka; Nias; Sumatra (Tandjong, Padang, Priaman); Java (Batavia!, Bantam, Cheribon, Tegal, Samarang); Madura; Borneo (Sungi duri, Sandakan); Celebes (Makassar!). — Aden, West coast Africa, Madagascar, Belutschistan, British India, Ceylon, Malay Peninsula, Siam, Tonkin, Southern China, Philippines, Australia (Queensland). In sea and estuaries.

4. **Otolithes maculatus** (C.V.)

Otolithus maculatus Cuvier & Valenciennes, Hist. Nat. Poissons V, 1830, p. 64.

Otolithus bispinosus Cuvier & Valenciennes, loc. cit. p. 65.

Otolithus maculatus Valenciennes, Règne anim. ed. illustrée, III, Poiss. 1839, Pl. 27, fig. 2.

Otolithus maculatus Bleeker, Verh. Batav. Gen. XXIII, (1849) 1850, Sciaenid. p. 15.

Otolithus maculatus Cantor, Cat. Malay. Fish. 1850, p. 1044.

Otolithus maculatus Günther, Cat. Brit. Mus. II, 1860, p. 310.

Otolithus maculatus Blyth, Journ. Asiat. Soc. Bengal XXIX (1860) 1861, p. 140.

Otolithus bispinosus Blyth, loc. cit. p. 141.
Otolithus maculatus Day, Proc. Zool. Soc. London 1869, p. 300.
Otolithus maculatus Bleeker, Verh. Akad. Amsterdam XIV, (1873) 1874, Sciénoid. p. 12. — Atl. ichth. IX, 1877, Tab. CCCLXXXIV. fig 3.
Otolithus maculatus Day, Fish. India 4° 1878—1888, p. 196. — Fish. Brit. India II, 1889, p. 127.
Otolithus maculatus Duncker, Mitth. Nat. Mus. Hamburg XXI, 1904, p. 154.
Otolithus maculatus Lloyd, Rec. Ind. Mus. I, 1907, p. 226.
Otolithus maculatus Seale, Philippine Journ. Sci. V, 1910, p. 297.
Otolithus maculatus Vinciguerra, Ann. Mus. Civ. Genova (3) X, 1926, p. 581.
Otolithus maculatus Hardenberg, Treubia XIII, 1931, p. 134.
Otolithus maculatus Borodin, Bull. Vanderbilt Mar. Museum I, 1932, p. 85.
Otolithes maculatus Fowler, Bull. U.S. Nat. Mus. XII, 1933, p. 359.
Otolithes maculatus Hardenberg, Treubia XIV, 1934, p. 309.
Otolithus maculatus Delsman & Hardenberg, Indische Zeevisschen 1934, p. 239 fig. 176.

D. IX—X, I, 30; A. II, 10—12; Ll. ca. 85; Ltr. $\begin{array}{c}13\\ \hline 1\\ \hline 25\end{array}$.

Elongate, not much compressed, height 4.4—5.50 in length, head 3.50—4, pointed, depressed, rostro-dorsal profile slightly ascending with a depression behind front. Eye 6—7 in head, 1.2—1.6 in slightly convex interorbital space, its diameter equal to or somewhat shorter than snout, situated in anterior half of head. Nostrils two approximate vertical slits, the posterior close to eye, the anterior narrower, with a rim. Cleft of mouth oblique, upper jaw reaching to below middle of pupil; upper border of maxilla concealed below suborbitals, distally rounded; mandible longer, prominent, with or without two pores at symphysis. Snout with three pores, its free border entire. Teeth in upper jaw pluriseriate, the inner series with close-set minute teeth, the outer with distant conical teeth and one or two canines on each side; mandibulary with a single series of distant unequal conical teeth and a pair of curved symphysial canines. Preopercle weakly denticulate, opercle with two flat weak spines. Scales cycloid, small, in irregular rows; lateral line slightly curved, the sensory tubes simple. Spinous dorsal somewhat triangular, the third and fourth spine being the highest, equal to half height of body or much less in adult, the spines slender, deeply separated from soft part, the base of which is about twice longer than that of spinous part, but much lower than that. Anal rounded, twice or less lower than height of body and about twice shorter than soft dorsal; its origin behind middle of soft dorsal, the two spines slender, flexible, the second longer than eye, the first shorter. Pectorals acutely rounded, equal to head without snout; ventrals shorter; caudal somewhat cuneiform, least height of its peduncle about twice diameter of eye. Greyish above, silvery below; irregular rows of dark unequal spots, usually about the size of the eye, on back, sides, sometimes also on soft dorsal and caudal; fins yellowish. Length according to Vinciguerra up to 450 mm.

Nomen indig: Djarang-Gigi (Malay, Batavia); Lensa (Serawak, Borneo).

Habitat: Singapore; Pinang; Sumatra (Bagan Si Api Api!, Mouth of Rokan); Java (Batavia!); Borneo (Sungiduri, Sandakan, Serawak). — British India, Malay Peninsula, Burma, Siam. In sea, brackish water, estuaries.

2. **Pama** Fowler

(Fowler, Bull. U.S. Nat. Mus. XII, 1933, p. 360)
type *Bola pama* Ham. Buch. 1822.
Collichthys Günther, Cat. Brit. Mus. II, 1860, p. 312 (p.p.) [1]).

Elongate, ovoid; head and trunk tapering towards compressed, rather long tail; head somewhat swollen, strongly convex in its ocular and praeocular part, its length surpassing that of height of body. Eye small, superior, situated in anterior third of head. Snout short, not overhanging jaw, its free border entire or superficially trisinuate with pores. Scales small cycloid on head, ciliate on body; lateral line anteriorly arched conform dorsal outline, sensory scales enlarged, ovally prolonged, the straight tubes distally branched, continued on caudal. Two approximate nostrils, the posterior close to eye, partially closed by a membrane, anterior much smaller, rounded. Mouth terminal, oblique, gape wide or moderate, jaws subequal, the upper jaw reaching at least to hindborder of eye, maxillary concealed, lower jaw included, with symphysial pores. Teeth in a close set series of small, sharp teeth, with an upper outer and a lower inner row of small, curved, far distant canines of unequal size. Preopercle crenulated with denticulations at its angle in young; opercle with two weak spines and a rounded, or triangular flap; posttemporal ciliate to fimbriate. Dorsal not deeply incised or entire; base of spinous part at least more than thrice shorter than soft part which has more than 40 rays, slightly increasing in height posteriorly and surpassing the height of the VI—X slender spines. Anal II, 7—9, rounded, the second spine normally slender, shorter than rays. Pectorals about equal head, ventrals shorter; caudal wedge-shaped, the median rays prolonged, particularly in young.

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[1]) About the use of the genus-name *Collichthys* Günther expressely says (Zool. Record III Pisces 1866, p. 143) "that the genus Collichthys was and is intended for *C. lucida* (Richards.) including *biaurita*". As neither *biaurita* nor *pama* (Ham. Buch.) can any longer be placed in *Collichthys* as Günther did and even less in *Sciaenoides* as Blyth and f.i. Day did, Fowler was right in instituting for *pama* and its congener *perarmata* Chabanaud the new genus *Pama*.

Distribution: In sea, estuaries and in the tidal part of rivers living fishes, attaining a large size; known from the western part of the Archipelago, British India, Malay Peninsula and Burma.

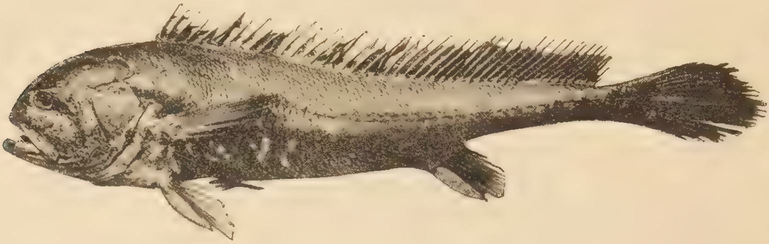

Fig. 101, *Pama perarmata* (Chabanaud) with hyperostotic thickened ventral and anal spine. Reduced, total length 530 mm. After Chabanaud.

Key to the indo-australian species of Pama

I. D. X, I, 41; base of spinous dorsal somewhat more than thrice in base of soft. Upper jaw reaching at least one eye-diameter behind eye . . 1. *P. pama* p. 496.

II. D. VI—VII, 42—44; base of spinous dorsal 5 to 7 times in base of soft. Upper jaw reaching to hindborder of eye . . . . 2. *P. perarmata* p. 498.

1. **Pama pama** (Ham. Buch.)

Bola pama Hamilton-Buchanan, Fishes Ganges 1822, p. 79, 368.
Sciaena pama Cuvier & Valenciennes, Hist. nat. Poiss. V, 1830, p. 55.
Collichthys pama Günther, Cat. Brit. Mus. II, 1860, p. 316.
Sciaena pama Rüppell, Samml. Senckenberg. Mus. 1852, p. 8.
Sciaena pama Bleeker, Verh. Batav. Gen. XXV, 1853, Voorindië, p. 92.
Sciaenoides hardwickii Blyth, Journ. Asiat. Soc. Bengal XXIX (1860) 1861, p. 139.
Sciaenoides pama Blyth, ibidem.
Sciaenoides hardwickii Day, Proc. Zool. Soc. London 1869, p. 516.
Sciaenoides pama Vinciguerra, Ann. Mus. Civ. Genova (2) II, 1885, p. 88.
Sciaenoides pama Vinciguerra, Pesci di Birmania 1890, p. 169.
Sciaenoides pama Day, Fish. India 4° 1878—1888, p. 193. — Fish. Brit. India II, 1889, p. 124.

Sciaenoides pama Steindachner, Ann. Hofmus. Wien XI, 1896, p. 227.
Collichthys pama Volz, Zool. Jahrb. Systematik XIX, 1903, p. 358.
Collichthys pama Duncker, Mitth. Naturhist. Mus. Hamburg XXI, 1904, p. 155.
Sciaenoides pama Lloyd, Rec. Indian Mus. I, 1907, p. 226.
Collichthys pama Fowler, Proc. Acad. Philadelphia (1931), 1932, p. 446.
Sciaenoides pama Hardenberg, Treubia XIII, 1931, p. 133.
Pama pama Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 360.
Pama pama Hardenberg, Treubia XIV, 1934, p. 309.

D. X, I, 40—45; A. II. 7; Ll. 48—50; Ltr. $\frac{9}{\frac{1}{18}}$. (between spinous D. and V.).

Elongate, its anterior ovoid part tapering towards rather long tail, head strongly convex, especially in its preocular part; height 5.1 in length, 6 in total length in young, in adult 5—6; head 3.8; 4.5 in total length in young, in adult 4.6. Eye 6.6—11 in head; for its major part situated in anterior third of head, far above horizontal through commencement of gape of mouth; twice to thrice in strongly convex interorbital space and 1.6—2 in snout, which goes about 4 times in head; its free border not overhanging, with two pores and two others higher up. Mouth terminal, oblique, its gape wide, the upper jaw about half length of head, reaching at least one eye diameter behind eye; maxillary concealed, its expansion truncate, equalling eye; lower jaw shorter, included, with two symphysial pores. Preopercle crenulated with denticulations at its angle, opercle with two weak spines and a triangular flap; posttemporal ciliate. Teeth in upper jaw in an irregular outer series of far distant curved canines of small but unequal size, inside of them a series of small sharp teeth with an anterior edentulous interspace; in lower jaw a similar, rather more complete series of canines, outside a series of small, sharp teeth forming on the hooked symphysis a broader band, opposite the edentulous interspace. Scales cycloid on head, on body ciliate; lateral line arched to above anal fin, the sensory scales enlarged and elongate with strongly arborescent tubes. Dorsal fin long, base of the spinous part more than thrice in that of the soft part. Spines slender, third and fourth highest, nearly thrice in length of head; rays slightly increasing in height posteriorly to prepenultimate rays, somewhat surpassing spines in height. Pectorals pointed, equalling length of head, ventrals about equal postocular part of head. Caudal wedge-shaped, the median rays strongly prolonged; caudal peduncle equal eye. Brownish above whitish below, fins uniform yellowish or grey. Length up to 1500 mm.

Habitat: Sumatra (Palembang, Bagan Si Api Api, Mouth of Rokan). — British India, Malay, Peninsula, Burma. In sea, entering estuaries and rivers as far as the tide extends.

2. **Pama perarmata** (Chabanaud) (Fig. 101 p. 496)

Sciaenoides perarmata Chabanaud, Bull. Mus. Hist. Nat. Paris XXXII, 1926, p. 266. — Arch. Mus. Hist. Nat. Paris (6) II, 1927, p. 38.
Pama perarmata Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 361.

D. VI, I, 42—43; A. II, 8—9; L.l. 48—50; L.tr. $\begin{array}{c}12\\ \hline 1\\ \hline 15\end{array}$. (below dorsal spines to middle of belly).

Oblong, strongly tapering and compressed posteriorly. Dorsal profile strongly convex to behind spinous dorsal, thence to caudal peduncle nearly straight, behind anal of little height; the height about five times in that of trunk. Head 4 tot 5 times in length, voluminous, its width more than twice in its length. Eye longitudinally elliptic, 4 to 6 in head, 1.33 to nearly twice in strongly convex interorbital space, equal to convex snout, situated in anterior third of head and above horizontal through commencement of cleft of mouth. Nostrils approximate, the anterior subcircular, the posterior close to eye with an anterior flap. Mouth terminal, oblique, wide; jaws subequal, maxillary nearly totally concealed by closed mouth, its distal expansion extends to posterior border of eye, has two sinuosities and is about equal to vertical diameter of eye. Intermaxillary with 10—13 distant, slightly curved, rather small canines getting smaller posteriorly and with an inner band of villiform teeth; mandibulary included with an outer narrow villiform band and an inner series of small distant canines. Posterior border of preopercle weakly crenulate and distantly denticulated at its rounded angle, getting obsolete with age; opercle with 2 flat spines and a distal rounded lobe; posttemporal finely serrate. Free border of snout superficially trisinuate, on both sides with 2 wide transversal slitlike pores, one situated between the rudimentary median and the lateral sinuousity, the other in the latter; a small pore on each side of the mandibular symphysis. Scales cycloid on head and small on its superior parts, on body ciliate; lateral line concurrent with dorsal profile, its scales enlarged with straight sensory tubes, distally strongly branched. Dorsal entire, spinous part short, 5 to 7 times contained in base of soft dorsal which increases in height posteriorly and is slightly higher than dorsal spines, the first of which is short, the second and third subequal, longer than the sequent, except the last which grows with age progressively in length and especially in width, finally to an enormous volume of 2.5 times in the length of head. Base of dorsal scaly, more developed on soft dorsal. Pectorals shorter than head, ventral spine getting enormous with age and attaining about half length of head; this takes place in old specimens also with the second anal spine. Caudal rhomboidal. In alcohol or formol brownish or dark greenish, opercular membrane and membrane of fins blackish. Length up to 530 mm. (After Chabanaud as we could dispose of one young specimen only of 175 mm. length, while the species reaches to 530 mm.).

Habitat: Borneo (Kumai, Dr. Hardenberg leg.)!. — Gulf of Siam.

Note: Chabanaud (l.s.c.) has shown that the present species is a remarkable example of the faculty of some *Sciaenidae* to produce a hyperostotic thickening of the spines of fins and of other superficially situated bones.

3. **Otolithoides** Fowler. (Fig. 97 p. 482)

(Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 364).

Collichthys Günther, Cat. Brit. Mus. II, 1860, p. 312 (p.p.).
Sciaenoides Blyth, Journ. Asiatic Soc. Bengal XXIX, 1860, p. 139 (nec Richardson 1843).

Oblong to elongate and slender, head bluntly pointed; snout not overhanging jaws, its free border entire, eventually with five small pores on top. Scales moderate to small, ciliate, on head cycloid; lateral line straight and anteriorly arched, continued on caudal; sensory scales thickly covered with minute scales. Eye in anterior half or third of head. Two approximate round nostrils, the posterior close to eye. Mouth terminal, wide, jaws oblique, the upper overlapping the lower, reaching hindborder of eye or surpassing it slightly; maxillary distally concealed, more or less expanded; lower jaw at symphysis with two or four pores. Preopercle denticulate, opercle with two non-pungent spines, posttemporal crenulate. Teeth in upper jaw in one or two inner villiform rows, externally a series of distant conical, sometimes curved teeth, the two anterior or two lateral ones on each side may be canine-like; in lower jaw an inner row of conical teeth, close-set or distant, one near symphysis may be canine-like, externally a villiform row; none on vomer, palatines or tongue. Spinous dorsal broadly connected with soft dorsal, its base more than twice to thrice shorter than that of lastnamed; third and fourth spine highest, more than thrice in head, 27—34 rays; anal II, 7, first anal spine small, second weak, about half of highest ray; dorsal and anal rounded, scaled at base only; caudal wedge-shaped, median point prolonged in young.

Distribution: Market fishes, much valued as food and producer of isinglass, some of them attaining a length of a meter or more, living in costal and brackish water of mouth of rivers in the indo-australian Archipelago and along the coasts of India, the Malay Peninsula, Cochin-China and Southern China.

Note. The three species *microdon, biauritus,* and *brunneus* can neither be placed in the genus *Sciaenoides* Blyth (Journ. Asiat. Soc. Bengal XXIX 1860) as Day did nor in Günther's genus *Collichthys* (Cat. Brit. Mus. II, 1860, p. 312) as Bleeker did, as the former name was preoccupied by Richardson (1843) and the name *Collichthys* is to be restricted to the single species *lucidus* Rich. (see p. 495). Fowler was therefore right to place them in the new genus *Otolithoides.*

Key to the indo-australian species of Otolithoides

I. 27 to 32 dorsal rays.
  a. Eye in anterior half of head; its lower margin in horizontal through commencement of gape of mouth . . . . 1. *O. biauritus* p. 500.
  b. Eye in anterior third of head, its lower margin above horizontal through commencement of gape of mouth . . . . 2. *O. brunneus* p. 502.
II. 32 to 34 dorsal rays; eye in anterior half of head; its lower margin far above indicated horizontal 3. *O. microdon* p. 503.

1. **Otolithoides biauritus** (Cantor)

Otolithus biauritus Cantor, Cat. Malayan Fishes 1850, p. 1039.
Otolithus biauritus Bleeker, Nat. Tijdschr. Ned. Indië III, (1851) 1852, p. 56. — Acta Soc. Sc. Indo-Neerl. III 1858, p. 3.
Sciaenoides biauritus Blyth, Journ. Asiat. Soc. Bengal XXIX (1860), 1861, p. 139.
Collichthys biauritus Günther, Cat. Brit. Mus. II, 1860. p. 315. — Zool. Record III, Pisces, 1866, p. 143.

Collichthys biaurita Bleeker, Ned. Tijdschr. Dierk. IV (1871), 1872, p. 142. — Verh. Akad. Amsterdam XIV (1873), 1874, Sciénoides p. 15.
Sciaenoides biauritus Bleeker, Atl. ichth. IX, 1877, Tab. 386, fig. 3.
Sciaenoides biauritus Day, Fish. India 4° 1878—1888, p. 194. — Fish. Brit. India II, 1889, p. 125.
Collichthys biaurita Duncker, Mitth. Naturh. Mus. Hamburg XXI, 1904, p. 155.
Sciaenoides biauritus Hardenberg, Treubia XIII, 1931, p. 133.
Otolithoides biauritus Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 365.
Otolithoides biauritus Hardenberg, Treubia XIV, 1934, p. 309.

D. IX, I, 27—32; A. II, 7; Ll. 60—70. L. tr. ca $\begin{array}{c}15\\\hline 1\\\hline 30\end{array}$ (between dorsal spines and ventrals).

Very elongate, slender, cylindrical, dorsal and ventral outline nearly horizontal; height 4.6 to 5.6 in length; head thrice to nearly four, bluntly pointed, dorsally depressed. Eye oval, its horizontal diameter 6—7 in head, about twice in flatly convex interorbital space, and about 1.5 in convex snout, situated in anterior half of head, its lower margin in horizontal through commencement of gape of mouth, its upper margin near dorsal profile of head. Free border of snout not overhanging jaw, not lobate, with five pores. Mouth terminal, oblique, gape wide, upper jaw not much less than half length of head, reaching behind eye, overlapping lower jaw, which is slightly shorter and included, with some symphysial pores; maxillary totally concealed, its expansion strongly rounded, equal horizontal diameter of eye. Preopercle above rounded angle indistinctly crenulated, opercle with two flat spines, posttemporal large, densely fimbriate. Scales small, ciliate only on flanks, largest on head, particularly on its dorsal part, where they are also cycloid; lateral line straight, the sensory scales enlarged, oval, covered by small scales. Teeth in intermaxillaries in a rather broad inner villiform band and an outer row of enlarged, conical, distant teeth, the 2 anterior canine-like; in mandibula in an outer continous series of small sharp cardiform-teeth, inside of them a row of far distant, curved canines, partly of small size. Spinous dorsal not deeply incised, its base about thrice shorter than soft dorsal; spines slender, second and third longest, about twice in height of body and about as high as rays, which are equally long. Anal rounded, second spine weak, less than half length of first ray. Pectorals obtusely pointed, as long as postorbital part of head; ventrals equal half length of head. Caudal rhomboid, least height of its peduncle equal one and a half times longest diameter of eye. Dorsally brownish to greenish grey, ventrally paler, everywhere dotted with brown; fins yellowish, minutely dotted with brown. Length approaching 2000 mm. [Specimen of Bleeker's collection in the Leiden Museum seen by us].

Nomen indig.: Salampri; Djarang-gigi, Petja piring (Malay, Batavia); Gulamah (Sumatra).

Habitat: Singapore, Pinang; Sumatra (Mouth of Rokan); Borneo (Sinkawang). — British India, Malay Peninsula, Cochin China, Hongkong, Philippines. —

Note. Chabanaud has shown in his paper on "Hyperostoses externes" in Sciaenidae (Arch. Muséum d'hist. nat. Paris (7) II, 1927, p. 37.) that the present species belongs to *Sciaenidae* distinguished by hyperostosis of some of their externally situated bones in age. In his case, in a fullgrown specimen of 630 mm. length, the fifth branchiostegal ray was on both sides hypertrophied into a thick saber-like bone, but otherwise of normal form.

2. **Otolithoides brunneus** (Day)

Otolithus brunneus Day, Journ. Linn. Soc. London XI, 1873, p. 524.
Sciaenoides brunneus Day, Fish. India 4°. 1878—1888, p. 195. — Fish. Brit. India II, 1889, p. 126.
Collichthys brunneus Fowler, Journ. Bombay Nat. Hist. Soc. XXXIII, 1929, p. 115.
Otolithoides brunneus Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 366.
Otolithoides brunneus Hardenberg, Treubia XIV, 1934, p. 309.
Otolithoides brunneus Fowler, Proc. Acad. Nat. Sci. Philadelphia LXXXVI, 1934, p. 153.

D. IX, I, 27—29; A. II,8; L.l. 50—51; L.tr. $\frac{10-11}{9-12}$.

Elongate, dorsal and ventral profile slightly arched; height 4 to $4\frac{4}{5}$ in length, head $3\frac{1}{2}$ to $3\frac{2}{3}$, evenly ascending to dorsal. Eye situated in anterior third of head, its lower margin above horizontal through commencement of gape of mouth, its upper margin close to dorsal profile of head, $4\frac{1}{4}$ to $5\frac{4}{5}$ in head, 1 to $1\frac{2}{5}$ in broadly convex interorbital space, $1\frac{1}{3}$ to $1\frac{3}{5}$ in bluntly rounded snout, which goes $3\frac{3}{5}$ to 4 in head, not overhangs jaw and without open pores. Mouth terminal, oblique, upper jaw reaches opposite hind eye edge in young, a little beyond with age; lower jaw slightly shorter than upper, a pair of pores and a pair of short slits on chin. Preopercle with a few widely separated serrations, most apparent at its rounded angle. Opercle with two obtuse points; posttemporal fimbriate along its free edge. Teeth in narrow villiform bands in jaws, upper outer row of strong well-spaced canines, 4 of which show when mouth closes and an inner row of small canines. Spinous dorsal well separated from soft, its base slightly more than twice in base of latter; spines weak, having filamentous terminations, 3rd to 6th of somewhat the same length, longest and about $^4/_9$ height of body. Soft dorsal highest in last third, where it equals or exceeds spinous dorsal. Pectorals as long as head behind middle of eye; ventrals only reach one third of distance to vent. Anal spines weak and short, the second $^1/_3$ of length of rays; length of base of fin $^2/_{11}$ or $^1/_6$ of that of soft dorsal. Caudal pointed, least depth of caudal peduncle $3^3/_5$ to $3\ ^2/_3$ in head. Scales rather oval, cycloid, and transversely elongated on head, ctenoid and vertically elongated on body, a few very fine ones over bases of soft dorsal and anal; lateral line gently curved to below first fourth of soft dorsal, where it becomes straight. Brownish, becoming golden below; fins darkest externally. Length attaining at least 450 mm. [After Day and Fowler, not seen by us].

Habitat: Sumatra (Mouth of Rokan, Bagan Si Api Api). — British India, Annam, China. In sea, entering mouth of rivers.

3. **Otolithoides microdon** (Blkr.). (Fig. 97, p. 482)

Otolithus microdon Bleeker, Verh. Batav. Gen. XXII, (1848) 1849, Ichth. Madura p. 10. — loc. cit. XXIII, (1849) 1850, Sciaenoid. p. 16. — Nat. Tijdschr. Ned. Indië, I, 1850, p. 99.
Sciaena microdon Günther, Cat. Brit. Mus. II, 1860, p. 294.
Collichthys microdon Bleeker, Ned. Tijdschr. Dierk. IV, (1871) 1872, p. 142. — Verh. Akad. Amsterdam XIV, (1873) 1874 Sciénoides, p. 16.
Sciaenoides microdon Bleeker, Atl. ichth. IX, 1877, Tab. 388, Fig. 5.
Sciaenoides microdon Day, Fish. India 4°. 1878—1888, p. 194. — Fish. Brit. India II, 1889, p. 125.
Sciaena microdon Duncker, Mitth. Nat. Mus. Hamburg, XXI, 1904, p. 154.
Sciaenoides microdon Lloyd, Rec. Indian Mus., I, 1907, p. 226.
Sciaenoides microdon Vinciguerra, Ann. Mus. Civico Genova (3), X, 1926, p. 581.
Sciaenoides microdon Hardenberg, Treubia XIII, 1931, p. 134.
Collichthys microdon Chevey, Invent. faune ichth. Indochine 1932, p. 22.
Otolithoides microdon Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 365.
Otolithoides microdon Hardenberg, Treubia XIV, 1934, p. 309.

D. IX, I, 32—34; A. II, 7—8; Ll. about 70—80 [1]); Ltr. $\frac{12}{18-20}$.

Slender, elongate. Height 4 to nearly 5 in length; rostro-dorsal profile somewhat convexly continued in the almost straight outline

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1) They are difficult to count as the sensory scales are thickly covered with minute scales.

of back; head 3.2—3.8 in length, bluntly pointed. Eye oblong, situated in anterior half of head, far above horizontal through commencement of gape of mouth; its horizontal diameter about 7 times in head, half length of slightly convex, flattish interorbital space in adult. Snout equal to that space, with five small pores on its top, its free border entire. Mouth terminal, oblique, the jaws nearly equal, the upper reaching almost to hindborder of eye; maxilla concealed, its expansion truncate, equal vertical diameter of eye; lower jaw with two small pores near symphysis. Nostrils approximate, the posterior close to eye, halfmoon-shaped, the anterior rounded somewhat smaller. Upper teeth in a single row of distant conical ones, the two anterior on each side canine-like, the most posterior largest; inside a narrow band of villiform teeth; lower jaw with a close-set single row of conical teeth, outside of them a single series of minute teeth. Opercle with a flat, non-pungent spine and a broad distal membrane; preopercle finely denticulate, its angle rounded, posttemporal crenulate. Scales ciliate, on head cycloid, on nape and the dorsal ones conspicuously smaller than those on flanks and tail, between lateral line and anterior half of dorsal in strongly oblique rows; lateral line thickly covered with minute scales, anteriorly arched to above vent, thence straight and continued to end of caudal. Dorsal not deeply incised, spinous part somewhat triangular, third spine highest, about thrice length of eye diameter, sequent spines gradatim diminishing in length to less than that diameter; soft part gradually increasing in height to twice diameter of eye, posteriorly rounded; base of spinous dorsal nearly thrice in that of soft dorsal. Anal rounded, its base about seven times in that of soft dorsal; first spine minute, second half length highest ray. Pectorals triangularly rounded, about equal to head without snout; ventrals one fifth shorter, reaching halfway anal. Caudal wedge-shaped, the median point rather broad, prolonged in young; least height of its peduncle almost twice eye diameter. Grayish above, silvery below, opercle with a bluish spot above; paired fins yellowish, median fins dusky, spinous dorsal blackish. Length 300 mm.

Nomen indig: Gomah-gomah, Gigi-djarang, Gulamah. (Malay, Java), Tigowodjo (Javan.). Kanglomo. (Madura).

Habitat: Singapore; Pinang; Sumatra (Palembang, Bagan Si Api Api!); Java (Batavia!, Samarang, Surabaja); Strait Madura; Borneo (Sinkawang, Sungi duri, Bandjermasin, Serawak). — British India, Malay Peninsula, Cochinchina, Southern China. In sea, brackish and fresh water of rivers.

4. **Pseudosciaena** Bleeker

(Ned. Tijdschr. Dierk. I, 1863, p. 142. Genotype *Ps. amblyceps* Blkr.)

Bola Jordan & Starks, Ann. Carnegie Mus. XI, 1917, p. 452.

Oblong, compressed; covered with small or moderate scales; on head, at least on opercles, cheeks and suborbitals cycloid, on trunk and tail all or in majority ciliate; lateral line more or less arched, the sensory scales not enlarged or squamate, the tubes fan-shaped or less branched. Snout convex, not inflated, not prominent before terminal mouth, its free border usually entire, not overhanging, above it with some pores. Gape of mouth wide, oblique; jaws equal or the upper slightly overlapping the lower. Mandible without a mental barbel, generally with five pores below symphysis. Teeth in jaws in villiform bands or series, in intermaxillaries an outer row conspicuously enlarged, the anterior occasionally canine-like, in mandibularies the inner row conical, enlarged, distant, of unequal size, the anterior usually the shortest. Spinous dorsal more or less deeply incised from soft: the IX—X spines flexible or rigid, depressible in a groove or not, much lower than height of body, the highest, generally the second to fourth, surpassing the height of soft dorsal which has 22—34 rays. Base of anal short, three to four and a half times in base of soft dorsal; both fins are at least basally covered with scales. Anal II, 6—8, the second spine weak and short or robust and long and surpassing two or three times diameter of eye. Caudal wedge-shaped or truncate.

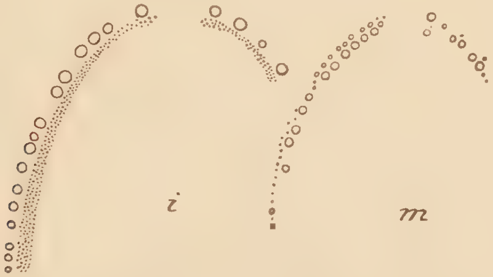

Fig. 102. Dentition of *Pseudosciaena soldado* (Lac.).
i intermaxillary, *m* mandibulary teeth.

Distribution: Carnivorous fishes, some attaining a large size, valued as food fish, the air bladder of some used for making isinglass; living in costal water, in brackish water of estuaries, some in fresh water of rivers; in the Archipelago principally in its western part, in the Philippines, straggling northwards to Southern China and Japan, southwards to Australia, westwards to Malay Peninsula, British India and East coast of Africa to Natal.

Key to the indo-australian species of Pseudosciaena

I. Second anal spine short and weak, equals 1 to 1½ diameter of eye.
  A. Lower margin of eye in or below horizontal through commencement of gape of mouth.
    1. Scales on head cycloid, otherwise ciliate; dorsal rays 28—30; origin of anal opposite 9.—11. dorsal ray, caudal rhombic; 7—8 scales between L.l. and spinous dorsal . . . . 1. *Ps. goldmani* p. 507.
    2. Majority of scales on head and body ciliate; dorsal rays 22—24; origin of anal opposite 12.—14. dorsal ray; caudal rounded inferiorly, emarginate superiorly with pointed upper corner; 8 scales between L.l. and spinous dorsal . . . 2. *Ps. aneus* p. 508.
  B. Eye above to far above horizontal through commencement of gape of mouth; scales on opercles, cheeks and suborbitals cycloid, otherwise ciliate; caudal rhombic.
    1. Dorsal rays 25—27; second anal spine opposite 9. dorsal ray; spinous dorsal shallowly notched; 7 scales between L.l. and spinous dorsal . . . . 3. *Ps. birtwistlei* p. 510.
    2. Dorsal rays 28; second anal spine opposite 14. dorsal ray; spinous dorsal deeply incised; 5—6 scales between L.l. and spinous dorsal, free border of snout entire . . . . 4. *Ps. axillaris* p. 511.
    3. Dorsal rays 27—29; second anal spine opposite 13. dorsal ray; spinous dorsal deeply incised; 6—7 scales between L.l. and spinous dorsal; free border of snout lobate . . . . 5. *Ps. sina* p. 513.
II. Second anal spine more or less robust, twice longer than eye to half length of head.
  A. With dark blotches on back and fins; 22—23 dorsal rays; scales ciliate, cycloid only

on snout and cheeks; 8 scales between L.l. and spinous dorsal . . . . 6. *Ps. diacanthus* p. 515.

B. Without blotches or bands; scales on opercles, cheeks and suborbitals cycloid, otherwise ciliate.
  - *a.* 5—6 scales between L.l. and spinous dorsal; 25—27 dorsal rays.
    - 1. Origin of anal opposite 12. dorsal ray; base of anal 5 times in base of soft dorsal . . . . 7. *Ps. coibor* p. 517.
    - 2. Origin of anal opposite 8. dorsal ray; base of anal 4 times in base of soft dorsal . . . . 8. *Ps. polycladiscus* p. 519.
  - *b.* About 9 scales between L.l. and spinous dorsal; base of anal almost 4 times in base of soft dorsal; 28—31 dorsal rays.
    - 1. Origin of anal opposite 9—10. dorsal ray; spinous dorsal deeply incised; 28—30 dorsal rays . . . . 9. *Ps. soldado* p. 520.
    - 2. Origin of anal opposite 8. dorsal ray; spinous dorsal shallowly notched; 31 dorsal rays . . . . 10. *Ps. microlepis* p. 522.
    - 3. Doubtful species: *(young)* dorsal rays 28—29; 6 scales between L.l. and spinous dorsal; L.l. about 40; second anal spine valid, less than twice longer than eye . . . . 11. *Ps. borneensis* p. 523.
    - 4. Doubtful species: (young and incomplete) . . . . 12. *Ps. plagiostoma* p. 525.

1. **Pseudosciaena goldmani** (Blkr.)

Corvina goldmanni Bleeker, Nat. Tijdschr. Ned. Indië, VII, 1854, p. 371.
Johnius goldmani Bleeker, opus citat. XVII 1858—1859, p. 145.
Sciaena goldmanni Günther, Cat. Brit. Mus. II, 1860, p. 293 (compiled).
Otolithus goldmani Bleeker, Ned. Tijdschr. Dierk. II, 1865, p. 285.
Pseudosciaena goldmani Bleeker, Verh. Akad. Amsterdam XIV (1873) 1874, Mém. Sciénoides, p. 33. — Atl. ichth. IX, 1877. Tab. 376, fig. 5.
Argyrosomus goldmani Fowler, Proc. Acad. Nat. Sci. Philadelphia, 1918, p. 43.
Johnius goldmanni Fowler, Proc. Acad. Nat. Sci. Philadelphia 1927, p. 286. — Fish. Oceania Mem. Bishop Mus. X, 1928, p. 235. — Bull. U. S. Nat. Mus. XII, 1933, p. 387.

D. X, I, 28—30; A. II, 8; Ll. 51—52; Ltr. ca. $\dfrac{7\text{—}8}{\dfrac{1}{10}}$.

Compressed, oblong; dorsal profile arched from snout to caudal peduncle, rostro-dorsal outline ascending in a straight line, ventral profile straight to anal. Height slightly more than head, 4.2 in length. Eye in anterior half of head, its lower margin situated in horizontal through commencement of gape of mouth; 4 in head, as long as flat interorbital space and as snout, which is convex, not prominent, with a median superficial lobe and no pores. Preopercle with rounded angle, dentate. Mouth terminal, oblique, upper jaw somewhat shorter than postorbital part of head, reaching to hindborder of pupil; maxillary concealed, its distal expansion rounded, equalling about half diameter of eye; mandibulary shorter, included, with 5 mental pores. Intermaxillary teeth in an inner villiform band and an outer row of distant conical teeth of medium size, getting smaller posteriorly, no caninoids; in the lower jaw the conical teeth are smaller than the intermaxillary ones. Dorsal deeply incised; the spinous part high, triangular, its base much less than twice in that of soft dorsal, spines flexible, the third highest, somewhat longer than postocular part of head, much higher than rays. Anal originating opposite 9th to 11th dorsal ray, its base more than four times in soft dorsal, second spine rather stout, about 1½ eye diameter long, at least ¹/₃ shorter than highest anal ray. Pectorals roundedly pointed, as long as head without snout, ventrals about equal. Caudal wedge-shaped, least height of its peduncle somewhat longer than eye. Length 195 mm. [Specimen of Bleeker's collection in the Leiden Museum seen by us].

Habitat: Bali; Batjan; Ambon; New-Guinea (Doreh). — Philippines.

2. **Pseudosciaena aneus** (Bloch)

Johnius aneus Bloch, Naturgesch. Ausländ. Fische VII, 1793, p. 135.
Johnius aneus Bloch, Schneider, Syst. ichth. 1801, p. 74.
Labrus aneus Lacépède, Hist. Nat. Poiss. III, 1802, pp. 447, 517.
Corvina anei Cuvier & Valenciennes, Hist. Nat. Poiss. V, 1830, p. 131.
Otolithus macrophthalmus Bleeker, Verh. Batav. Gen. XXIII, (1849) 1850, Sciénoides p. 16. — Nat. Tijdschr. Ned. Indië, I, 1850, p. 99.
Sciaena macrophthalmus Günther, Cat. Brit. Mus. II, 1860, p. 291.
Johnius anei Blyth, Journ. Asiat. Soc. Bengal XXIX, (1860) 1861, p. 141.
Otolithus aneus Day, Proc. Zool. Soc. London 1867, p. 939.
Corvina macrophthalmus Bleeker, Verh. Akad. Amsterdam (2) II, (1867) 1868, p. 292.
Otolithus leuciscus Günther, Ann. Mag. Nat. Hist. (4) X, 1872, p. 398.
Pseudosciaena macrophthalmus Bleeker, Verh. Akad. Amsterdam XIV, (1873) 1874 p. 21.
Pseudosciaena aneus Bleeker, Atl. ichth. IX, 1877. Tab. 385, fig. 2.
Sciaena aneus Day, Fish. India 4°, 1878—1888, p. 189. — Fish. Brit. India II, 1889, p. 119.
Pseudosciaena anea Jordan & Seale, Bull. Bur. Fish. XXVI (1906) 1907, p. 25.
Sciaena aneus Lloyd, Rec. Indian Mus. Calcutta I, 1907, p. 226.

Pseudosciaena anea Jordan & Richardson, Bull. Bur. Fish. 1908, p. 261.
Pseudosciaena anea Seale, Philippine Journ. Sci. V, 1910, p. 250.
Pseudosciaena anaeus Bean & Weed, Proc. U. S. Nat. Mus. XLII, 1912, p. 606.
Argyrosomus aneus Fowler, Copeia No. 58, 1918, p. 64.
Johnius aneus Herre, Notes Fish. Zool. Mus. Stanford Univers. 1931, p. 57.
Otolithus aneus Fowler, Proc. Acad. Nat. Sci. Philadelphia (1931) 1932, p. 446.
Johnius aneus Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 376.
Johnius aneus Hardenberg, Treubia, XIV, 1934, p. 309.

D. X, I, 22—24; A. II, 7—8; Ll. 50—52; Ltr. $\overset{8}{\underset{18}{\overline{\underline{1}}}}$.

Compressed, oblong; dorsal profile somewhat convex from snout to caudal peduncle with a slight concavity above eyes, ventral profile less convex. Height 3.3, head 3 in length. Eye situated in anterior half of head, its lower margin below horizontal through commencement of gape of mouth; about 4.1 in head, slightly shorter than flatly convex interorbital space. Snout in adult nearly equal eye, pointedly convex, with a median pore, not prominent, its free border entire with an indication of an incision on each side, not overhanging. Nostrils oval, the posterior larger, close to eye. Mouth terminal, oblique, wide, upper jaw about equal half head, in adult reaching hind-border of pupil; maxillary concealed except lower half of its truncate to excavate expansion which is broader than half eye diameter. Lower jaw subequal upper or slightly longer, with at least two mental pores. Teeth in a narrow inner villiform band in intermaxillaries and an outer series of enlarged distant, curved conical ones, the two anterior caninoid; in mandibularies an outer villiform series, inside a row of distant, unequal conical ones, less enlarged than the upper. Scales on suborbitals, cheeks and opercles cycloid, otherwise in majority ciliate, on nape and predorsal smaller, on trunk and tail larger; lateral line arched, concurrent with back to opposite anal, the sensory tubes anteriorly fan-shaped, posteriorly bifid. Preopercle slightly denticulate, opercle with two flat weak spines, posttemporal fimbriate. Spinous dorsal deeply incised, its base little more than half base of soft dorsal, third spine highest, about twice height of body or 2½ times in length of head, second and fourth spine slightly shorter and somewhat less than thrice in length of head; they are slender, terminating in a filament and much higher than rays. Dorsal and anal rounded, the base of the latter nearly 4 times in that of soft dorsal; origin of anal opposite 12th to 14th dorsal ray, second anal spine rather weak, nearly equal eye diameter. Pectorals about as long as head without snout, ventrals somewhat longer than postocular part of head, first ray with short filament. Caudal rounded inferiorly, emarginate superiorly with pointed upper corner, least height of caudal peduncle somewhat longer than eye. Brownish to grayish above, sides and lower surface lighter to silvery, fins hyaline, spinous dorsal and caudal usually darkly dotted, the rows of scales above lateral line may show more or less distinct, narrow black lines. Length up to 225 mm. [Specimen of *macrophthalmus* in Bleeker's collection in Amsterdam Museum seen by us].

Nomen indig: Gigi-djarang (Malay); Tigowodjo (Javan.); Grabak (Madura).

Habitat: Singapore; Banka; Bintang; Sumatra (Mouth of Rokan river!); Java (Batavia!, Bantam, Semarang, Passaruan); Borneo (Sandakan!); Celebes (Makassar, Badjoa, Bukan Isl.). — British India, Ceylon, Andamans, Philippines, Southern China. In sea and mouth of rivers.

3. **Pseudosciaena birtwistlei** (Fowler)

Johnius birtwistlei Fowler, Proc. Acad. Nat. Sci. Philadelphia 1931, p. 446. — Bull. U. S. Nat. Mus. XII, 1933, p. 403.

D. X, I, 25—27; A. II, 7; L.l. 49—50; L.tr. $\frac{7}{\frac{1}{12-13}}$.

Elongate, dorsal profile from snout to short caudal peduncle evenly convex, the ventral profile more so. Height 3.8—4; head 3.2—3.3 in length, bluntly pointed. Eye 5 or somewhat more in head, elliptic, situated high up in anterior half of head, its lower margin somewhat above horizontal through commencement of gape of mouth, equal to broadly convex interorbital space, 1.2—1.3 in bluntly pointed, somewhat prominent snout; its free border mesially with a lobe, on each side pointed, overhanging partially the upperlip; above its base three pores. Mouth oblique, terminal, upper jaw 2.4—2.5 times in length of head, reaching nearly hindborder of eye; maxillary concealed, the distal expansion obliquely truncate, broader than half eye diameter, lower jaw included; below symphysis a lobate median pore, on each side two lateral pores. Preopercle with rounded angle, its border distally dentate; opercle with an ample sinuate membranaceous border covering base of pectoral; posttemporal fimbriate, the fimbriae inclosed in membrane. Scales ciliate, on snout above and below to about middle of eye cycloid; lateral line slightly arched to above origin of anal, sensory tubes arborescent. Teeth in intermaxillaries in a rather broad villiform band and in an outer row of few distant conical ones, the two or three anterior on each side caninoid and exposed, when mouth is closed overhanging lower jaw, which has a single villiform series, somewhat broader anteriorly and an inner row of distant conical teeth. Spinous dorsal in adult deeply, in immature shallowly notched, its base goes somewhat more than twice in soft dorsal, the spines slender, flexible, forming a triangular fin, the third and fourth highest, nearly 2.4 times in head, surpassing height of soft dorsal. Base of anal goes four times in that of soft dorsal, its origin opposite 9th to 10th dorsal ray; the second anal rather weak, about length of snout and $^1/_4$ shorter than first anal ray. Base of soft dorsal and anal with one row of scales. Pectorals acutely pointed, nearly 1.2 in head, ventrals nearly twice. Caudal wedge-shaped, the lower half pointed, elongate; its peduncle about ¼ longer than eye. Upper surface brownish with oblique streaks along row of scales, underside light reddish as also the paired fins, spinous dorsal with a blackish colour towards margin, soft dorsal and caudal less so. Length up to 275 mm.

Habitat: Singapore; Sumatra (Mouth of Rokan!). — Malay Peninsula (off Perak River, 20 fathoms!).

Note: In case our determination of two immature specimens of 135 and 145 mm length from Rokan River and five fullgrown specimens off Perak River is correct, they differ from Fowler's figure, in having a longer soft dorsal, the distance of the 25 rays from each other being greater. In our two younger examples the spinous dorsal is shallowly notched as in Fowler's figure, while in the older examples from Malay Peninsula the separation from soft dorsal is rather deep. The dentition and the terminal mouth indicate that the species belongs to *Pseudosciaena.*

4. **Pseudosciaena axillaris** (C.V.)

Corvina axillaris Cuvier & Valenciennes, Hist. Nat. Poiss. V, 1830, p. 113.
Corvina axillaris Valenciennes, in Bélanger Voy. Ind. Orient. Zool. II, 1834, p. 356.
Corvina axillaris Bleeker, Verh. Batav. Gen. XXV, 1853, p. 36.
Corvina axillaris Günther, Cat. Brit. Mus. II, 1860, p. 302.
Corvina axillaris Sauvage, Bull. Soc. Philomat. (7) V, 1881, p. 106.
Corvina axillaris De Vis, Proc. Linn. Soc. N.S. Wales IX, 1884, p. 538.
Sciaena axillaris Day, Fish. India 4° 1878—1888, p. 188. — Fish. Brit. India II, 1889, p. 116.

Sciaena axillaris Rutter, Proc. Acad. Nat. Sci. Philadelphia 1897, p. 76.
Corvina papuensis Hase, Jen. Ztschr. Naturw. LI, 1914, p. 531.
Bola axillaris Jordan & Starks, Ann. Carnegie Mus. XI, 1917, p. 452.
Sciaena axillaris Hora, Journ. Nat. Hist. Soc. Siam VI, 1923, p. 177.
Johnius papuensis Fowler, Fish. Oceania Bishop Mus. X, 1928, p. 235.
Pseudosciaena axillaris Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 57.
Johnius axillaris Fowler, Bull. U.S. Nat. Mus. XII, 1933, p. 397.

D. X, I, 28; A. II, 7—8; L.l. 48—50; L.tr. $\begin{array}{c}5\text{—}6\\ \hline 1\\ \hline 9\text{—}10\end{array}$.

Compressed, oblong; dorsal profile from snout to caudal peduncle arched, ventral profile to anal nearly straight, height about equal head, 3—7 in length. Eye situated in anterior half of head, far above horizontal through commencement of gape of mouth, 4—5 in head, about 1.3 in rather flat interorbital space and about 1.6 in convex snout, the free border of which has mesially a slightly prominent lobe. Mouth oblique, terminal, upper jaw slightly longest, reaching middle of eye or somewhat further, more, than twice in head; maxillary concealed, its distal expansion truncated, shorter than diameter of eye; mandibulary with a symphysial knob and below it a median pore with two slitlike pores on either side. No pores on top of snout. Preopercle crenulate, opercle with two non-pungent flat spines, posttemporal denticulate to entire. Intermaxillaries with an outer anterior row of a few distant enlarged teeth, inside of them a narrow villiform band, wanting anteriorly; in mandibularies a single continuous row of enlarged teeth. Scales rather large, on cheeks, suborbitals and opercles cycloid, otherwise ciliate, dense on base of soft dorsal, forming a sheath for anal; lateral line not highly arched to opposite anal, with branched sensory tubes, anteriorly fan-shaped, posteriorly bi- to trifid; above its arched part the scales run obliquely upwards, below it at an angle with the lateral line; they run parallel with the straight portion of the line. Dorsal deeply notched, base of spinous portion somewhat less than half length of that of soft; spines rather slender, the third and fourth the highest, somewhat less than length of snout and eye, much higher than dorsal rays. Base of anal four times in that of soft dorsal, originating opposite about below 13th to 14th dorsal ray; second spine rather stout, longer than eye diameter, ¼ lower than first ray. Pectorals somewhat longer than head without snout, ventrals pointed, nearly equal postorbital part of head, the first ray filamentous. Caudal cuneate to rounded, least height of its peduncle equal eye in young, in adult somewhat less than twice diameter of eye. Brownish to grayish above, whitish below with silvery hue, spinous dorsal dusky towards margin, getting blackish, as also in adult, the margin of the soft dorsal and the terminal part of the caudal; the dark colour of the pectoral axilla extends considerably above base of pectoral. Length up to 265 mm.

Habitat: South-coast of Java (Batu Ulu!); New Guinea (Kaiser Wilhelm Land). — British India!, Ceylon, Southern China, Philippines, Australia (Queensland, Brisbane). In sea and mouth of rivers.

5. **Pseudosciaena sina** (C.V.)

Corvina sina Cuvier & Valenciennes, Hist. nat. Poiss. V, 1830, p. 122.
Corvina sina Valenciennes, in Bélanger, Voy. Ind. Orient. Zool. II, 1834, p. 359.
Otolithus vogleri Bleeker, Nat. Tijdschr. Ned. Indië IV, 1853, p. 253. — Verh. Batav. Gen. XXV, 1853, p. 36.
Corvina sina Bleeker, Verh. Batav. Gen. XXVI, 1854—57, Japan, p. 82.
Sciaena sina Günther, Cat. Brit. Mus. II, 1860, p. 292.
Sciaena vogleri Günther, loc. cit. p. 294.
Johnius sina Blyth, Journ. Asiat. Soc. Bengal II, (1860) 1861, p. 141.
Sciaena sina Playfair, Fishes Zanzibar 1866, p. 53.
Corvina sina Bleeker, Versl. Akad. Amsterdam (2) III (1867) 1869, p. 238.
Pseudosciaena vogleri Bleeker, Verh. Akad. Amsterdam XIV, (1873) 1874, Mém. Sciénoid. p. 35. — Atl. ichth. IX, 1877. Tab. 386, fig. 4
Sciaena sina Günther, Rep. Zool. Challenger-Exp. VI, 1880, p. 66.
Sciaena vogleri Day, Fish. India 4°, 1878—1888, p. 166.
Sciaena sina Day, ibidem.
Sciaena vogleri Day, Fish. Brit. India II, 1889, p. 113.
Sciaena sina Day, loc. cit. p. 114.
Sciaena parva Gilchrist & Thompson, Ann. S. African Mus. VI, 1908, p. 183.
Sciaena sina Franz, Japan. Knochenfische 1910, p. 45.
Johnius vogleri Seale, Philippine Journ. Sci. V, 1910, p. 280.
Corvina sina Jordan & Thompson, Proc. U.S. Nat. Mus. XXIX, 1911, p. 254.
Sciaena sina Zugmayer, Abh. Akad. München XXVI, 1913, p. 19.
Sciaena vogleri Zugmayer, ibidem.
Sciaena marleyi Norman, Ann. Mag. Nat. Hist. (9) IX, 1922, p. 321.
Johnius marleyi Fowler, Proc. Acad. Nat. Sci. Philadelphia 1925, p. 247.
Johnius parvus Fowler, ibidem.
Sciaena vogleri Barnard, Ann. S. African Mus. XXI, 1925—27, p. 571.
Sciaena vogleri Vinciguerra, Ann. Mus. Civ. Genova (3) X, 1926, p. 577.
Johnius sina Fowler, Journ. Bombay Nat. Hist. Soc. XXXIII, 1929, p. 115.
Sciaena vogleri Hardenberg, Treubia 1931, p. 130.
Johnius vogleri Fowler, Proc. Acad. Philadelphia (1931) 1932, p. 446.
Sciaena sina Herre & Myers Lingnan Sc. Journ. X, 1931, p. 251.
Johnius sina Fowler, Bull. U.S. Nat. Mus. XII, 1933, p. 388.
Johnius sina Hardenberg, Treubia XIV, 1934, p. 309.

D. X, I, 27—29; A, II, 7; Ll. 48—50; Ltr. $\begin{array}{c}6-7\\ \hline 1\\ \hline 12-13\end{array}$.

Oblong, compressed; dorsal profile in adult from snout to dorsal strongly convex, thence less to caudal peduncle, ventral profile straight. Height 3.3—3.41, head 3.15—3.3. Eye 4—4.6, situated in anterior half of head, its lower margin above horizontal through commencement of mouth, equal to or somewhat shorter than convex interorbital space; snout somewhat longer, its free border lobate. Mouth terminal, oblique, upper jaw slightly longer than lower, its length somewhat surpassing half length of head and extending to middle or hindborder of eye; maxillary concealed, its truncate expansion about half diameter of eye. Below mandibular symphysis 5 pores. Posterior nostril close to middle of eye, oval, the approximate anterior much smaller and rounded. Preopercle crenulate, the rounded angle distantly denticulate; opercle with two flat spines, posttemporal ciliate. Teeth in jaws in rather narrow villiform bands, an outer series of distant conical, enlarged, somewhat caninoid teeth, visible by half closed mouth in upper, an inner close-set series of conical enlarged ones in lower jaw. Scales on opercles, cheeks, suborbitals and snout cycloid, otherwise ciliate; lateral line arched to before middle of soft dorsal, sensory scales arborescent. Origin of spinous dorsal opposite that of pectoral, its base about twice in that of soft dorsal; the spines rather slender, third and fourth spine highest, about 2½ times in head, somewhat higher than middle highest rays. Origin of anal before middle of soft dorsal, second spine rather weak, nearly equal eye, about ⅓ of first ray. Base of soft dorsal and anal scaly, both fins rounded. Pectorals falciform, shorter than head, the ventrals less than head without snout. Caudal rhomboidal, the lower median rays longest, least height of caudal peduncle less than ½ diameter of eye. Silvery, grey, or brownish above, sometimes with faint indication of oblique stripes following row of scales, opercle with dark bluish patch, dorsal fuscous, other fins hyaline to yellowish. Length 250 mm. [Specimen of *Ps. vogleri* in Bleeker's collection in Leiden Museum seen by us].

Habitat: Singapore; Sumatra (Benkulen, Mouth of Rokan, Bagan Si Api Api); Borneo (Serawak, Sandakan); Celebes. — Eastcoast Africa from Zanzibar to Natal, Madagascar, Arabia, Belutschistan, British India, Ceylon, Southern China, Japan, Philippines. In sea and brackish water.

Note: Even as Fowler we fail to find characters to maintain *Otolithus* (*Pseudosciaena*) *vogleri* Blkr. as a distinct species, though Bleeker's specimens show a shallow concavity above eyes and a flat interorbital space. Bleeker comparing his two young specimens with *Corvina sina* C.V. calls them "fort voisine, mais dans le sina les écailles sont moins nombreux, les yeux plus grands, le museau plus court, les sous-orbitaires moins hauts etc." but these differences seem to us to depend on differences in size, preservation and perhaps also of sex and locality as this wide-spread species will be apt to produce local races; the differences will probably depend also on different counting of scales by different authors.

We have both: *Sciaena vogleri* and *sina* Day, placed in our synonymy as his diagnoses show no differences of any specific importance. That he describes the snout in his *sina* "rather inflated and scarcely overhanging and that it has no large lobe" may depend on the manner of preservation.

6. **Pseudosciaena diacanthus** (Lac.)

Lutjanus diacanthus Lacépède, Hist. Nat. Poiss. IV, 1802, pp. 195, 240.
Johnius cataleus Cuvier, Règne anim. 2. édit. II, 1829, p. 173.
Corvina catalea Cuvier & Valenciennes, Hist. Nat. Poiss. V, 1830, p. 128.
Corvina chaptis Cuvier & Valenciennes, loc. cit. p. 130.
Corvina catalea Valenciennes, Voy. Ind. Orient. Bélanger, Zool. II, 1834, p. 360.
Johnius Valenciennii Eydoux & Souleyet, Voyage „Bonite" Zool. I, 1841, p. 159.
Johnius catalea Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3) II, 1845, p. 523.
Corvina catalea Bleeker, Verh. Batav. Gen. XXII, (1848) 1849, p. 4. — op. cit. XXIII, (1849) 1850, p. 18.
Johnius diacanthus Cantor, Cat. Malay. Fishes 1850, p. 1049.
Corvina chaptis Bleeker, Verh. Batav. Gen. XXV, 1853, p. 36.
Johnius diacanthus Bleeker, Nat. Tijdschr. Ned. Indië XIII, 1857, p. 326.
Johnius chaptis Blyth, Journ. Asiat. Soc. Bengal XXIX, (1860) 1861, p. 141.
Sciaena diacanthus Günther, Cat. Brit. Mus. II 1860, p. 290.
Sciaena diacanthus Day, Proc. Zool. Soc. London 1865, p. 18.
Johnius diacanthus Kner, Novara-Exp. Fische 1865, p. 133.
Corvina diacanthus Bleeker, Ned. Tijdschr. Dierk. IV, (1871) 1872, p. 142.
Pseudosciaena diacanthus Bleeker, Verh. Akad. Amsterdam XIV, (1873) 1875, Rév. Sciénoides, p. 27. — Atl. ichth. IX, 1877, Tab. 388, fig. 2.
Sciaena diacanthus Day, Fish. India 4° 1878—1888, p. 189. — Fish. Brit. India II, 1889, p. 118.
Sciaena diacanthus Duncker, Mitth. Nat. Mus. Hamburg XXI, 1904, p. 154.
Sciaena diacanthus Johnstone, Pearl-Oyster Rep. II, 1904, p. 217.
Pseudosciaena diacanthus Seale, Philippine Journ. Sci. V, 1910, p. 279.
Sciaena diacanthus Vinciguerra, Ann. Mus. Civ. Genova (3) X, 1926, p. 578.

Sciaena diacanthus Pillay, Journ. Bombay Nat. Hist. Soc. XXXIII, 1929, p. 366.
Johnius diacanthus Fowler, ibidem, p. 115.
Corvina nigromaculata Borodin, Bull. Vanderbilt Marine Mus. I, 1930, p. 53.
Johnius diacanthus Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 57.
Sciaena diacanthus Herre & Myers, Lingnan Sci. Journ. X, 1931, p. 251.
Johnius diacanthus Fowler, Bull. U.S. Nat. Mus. XII, 1933, p. 374.

D. X, I, 22—23; A. II, 7; Ll. about 50; Ltr. $\begin{array}{c} 7\text{—}8 \\ \hline 1 \\ \hline 14\text{—}15 \end{array}$.

Oblong, compressed; dorsal profile ascending from snout in a nearly straight line to dorsal, furtheron highly convex in adult, ventral profile straight. Height over 3 to nearly 4 in length, head bluntly pointed, slightly longer. Eye situated in anterior half of head, far distant above horizontal through commencement of cleft of mouth, 5 to more than 6 in head, equal to or somewhat less than convex interorbital space and convex snout, the free border of which has a lateral incision but occasionally no conspicuous pores on top. Mouth feebly oblique, upper jaw slightly the longer, reaching to hindborder of eye or somewhat surpassing it, maxillary distally not concealed, not much expanded and truncate; below mandibulary symphysis a median tubercle in a groove, on both sides two conspicuous pores. Entire hindborder of preopercle in adult weakly denticulate, at angle in young, opercle with two weak spines, posttemporal serrated. Teeth in intermaxillaries in an inner narrow villiform band and an outer row of somewhat enlarged distant conical ones, in mandibularies an outer villiform series and an inner row of distant unequal conical teeth, no canine-like above and below. Scales in anterior part of head cycloid, otherwise ciliate, predorsally smallest; lateral line arched concurrent with dorsal profile, anterior sensory tubes branched. Soft dorsal and anal with a low scaly sheath. Base of spinous dorsal less than twice in that of rounded soft dorsal; spines slender, third and fourth highest, about half height of body. Base of anal nearly four times in soft dorsal, originating before middle of that fin, spines moderate, the second much shorter than first ray, up to twice longer than eye. Pectorals acutely rounded, nearly equalling head without snout, ventrals as long as postocular part of head. Caudal rhombic, more pointed in young, least height of its peduncle one third longer than eye. In adult more or less deeply greyish or brown on back, silvery below, fins yellowish with black dots, in immature fins grayish with dark edges, or totally brown or black; in young dorsally on head, back, dorsal and caudal fins with numerous irregular black spots of different size or vertically banded. Length reaching at least 1500 mm. [Specimens of Bleeker's collection seen by us].

Nomen indig: Tambareh (Malay), Tigowodjo (Javan.), Ganglomo (Madura).

Habitat: Singapore,; Pinang; Banka; Java (Batavia!); Madura; Borneo (Sandakan, Serawak). — British India, Ceylon, Malay Peninsula, Burma, Southern China (Shanghai, Hongkong, Canton, Macao), Philippines. — In sea and mouth of rivers.

7. **Pseudosciaena coibor** (Ham. Buch.) (Fig. 103, p. 518)

Bola coibor Hamilton Buchanan, Fish. Ganges, 1822, pp. 78, 368.
Corvina albida Cuvier & Valenciennes, Hist. Nat. Poiss. V, 1830, p. 93.
Corvina anei Cuvier & Valenciennes, loc. cit. p. 131.
Corvina albida Valenciennes, Bélanger, Voy. Ind.-Orient. Zool. II, 1834, p. 355.
Johnius anei Blyth, Proc. Asiat. Soc. Bengal, 1860, p. 141.
Corvina albida Günther, Cat. Brit. Mus. II, 1860, p. 304.
Pseudosciaena albida Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 145.
Corvina albida Bleeker, Opus citat. IV, (1871) 1872, p. 142.
Corvina albida Day, Fish. Malabar 1865, p. 54.
Corvina neilli Day, loc. cit. p. 55.
Sciaena albida Day, Fish. India 4°, 1878—1888, p. 188. — Fish. Brit. India II, 1889, p. 117.
Corvina albida Macleay, Descr. Cat. Austral. Fish. II 1881, p. 155.
Sciaena albida Zugmayer, Abh. Bayer. Akad. XXVI, 1913, p. 19.
Sciaena albida Ogilby, Mem. Queensland Mus. VI, 1918, p. 85.
Sciaena coibor Chaudhuri, Mem. Ind. Mus. V, 1923, p. 724.
Sciaena albida Pillay, Journ. Bombay Nat. Hist. Soc. XXXIII, 1929, p. 366.
Sciaena albida Hardenberg, Treubia XIII, 1931, p. 131.
Johnius coibor Fowler, Bull. U.S. Nat. Mus. XII, 1933, p. 378.
Johnius coibor Hardenberg, Treubia XIV, 1934, p. 309.

D. X, I, 25—27; A. II, 7; Ll. 53—55; Ltr. $\frac{7}{16-17}$.

Anteriorly elevated, posteriorly compressed; in specimens of about 275 mm length rostro-dorsal profile strongly convex, back rounded tapering to caudal, ventral outline rather straight to caudal, height 3.1, head with rounded opercular border slightly shorter. Longest diameter of eye 5 in head, about 4 in smaller, 7 in full-grown specimen, eye situated in anterior half of head, high up above mouth, about equal to convex interorbital space and to snout. Snout blunt, its top with three small pores and a somewhat triangular shallow excavation, below which its free border has two emarginated lobes; upper jaw reaching to vertical through hindborder of eye, in smaller examples not so far; maxillary nearly totally concealed under suborbital, its distal expansion truncate, broader than half diameter of eye; lower jaw slightly shorter, behind symphysis a rounded knob in a pore, on each side a small slitlike pore, outside of which a deep pore in a rather long triangular opening distally closed by a dermal fold. Day describes, probably in older examples, a short barbel between the central and lateral pore and a very minute one behind the lateral pore. Opercle with a broad flat non-pungent spine, the hindborder membranaceous, posttemporal crenulated, preopercle dentate on angle and on the vertical border, disappearing with age. Posterior nostril obliquely elliptical, the anterior smaller, rounded. Teeth in upper jaw in a moderately broad villiform band, outside a single row of distant conical teeth, in lower jaw a single series of close-set conical teeth, outside of them a single series of much smaller teeth, getting more numerous posteriorly. Scales small and cycloid on head, along base of soft dorsal, anal and on caudal; larger and finely ciliated on body, largest on flanks and belly; above lateral line to opposite anal in oblique rows, below lateral line anteriorly also oblique becoming horizontal beyond base of anal; lateral line arched to opposite anal, thence straight and continued on caudal, the tubes branched. Spinous dorsal deeply incised, its base more than half length of soft dorsal; first spine minute, second about two-third of the third which is the longest, equal snout and eye, the sequent gradatim shorter; anterior dorsal rays about height of second spine, posteriorly decreasing. First anal spine minute, second rather strong, not much shorter than first ray, origin of anal opposite 12th dorsal ray, its base about five times in that of soft dorsal. Pectorals acute, equal head without snout, ventrals somewhat longer than half length of head, first ray fili-

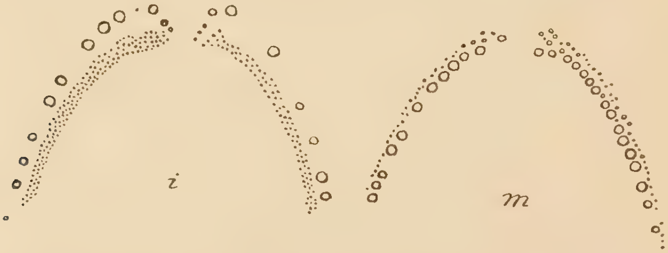

Fig. 103. Dentition of *Pseudosciaena coibor* (Ham. Buch.)
i intermaxillary, *m* mandibulary teeth.

form. Caudal rounded in young, cuneate with age, least height of its peduncle somewhat longer than diameter of eye. Dark grayish above, silvery with a purplish hue below, diffuse dark oblique lines according rows of scales; head dorsally violet brown, paired fins yellowish, spinous dorsal with blackish upper edge. Length up to more than 1200 mm after Chaudhuri.

Habitat: Pinang, Sumatra (Rokan River); Java Sea!. — British India (Belutschistan, Malabar, Coromandel), Ceylon, Malay Peninsula!, Chilka Lake, Australia (Norman River). In sea and estuaries.

8. **Pseudosciaena polycladiscus** (Blkr.)

Corvina polykladiskos Bleeker, Nat. Tijdschr. Ned. Indië III, 1852, p. 420.
Corvina polycladiscus Günther, Cat. Brit. Mus. II, 1860, p. 301. (compiled).
Pseudosciaena polycladiscus Bleeker, Verh. Akad. Amsterdam XIV, 1874, Mém. Sciénoides p. 29. — Atl. ichth. IX, 1877, Tab. 384. fig. 4.
Johnius polykladiskos Fowler, Bull. U S. Nat. Mus. XII, 1933, p. 388. (compiled).

D. X, I, 27; A. II, 7; L.l. 48; L.tr. $\begin{array}{c}5-6\\ \hline 1\\ \hline 12-13\end{array}$.

Oblong, compressed; dorsal profile from snout to dorsal fin convexly ascending with a slight concavity above eyes, thence evenly descending to rather slender tail, ventral profile nearly straight. Height 3.9; head 3.66 in length, obtusely pointed. Eye in anterior half of head, its lower margin somewhat above horizontal through commencement of gape of mouth, 5.4 in head, nearly equal to flat interorbital space, somewhat shorter than convex not prominent snout, its free border not overhanging, with a superficial incision on each side and a median (in the single individual somewhat mutilated) not prominent lobe. Mouth oblique, upper jaw overlapping, reaching posterior third of eye, maxillary concealed with distal truncate expansion; lower jaw included, at symphysis somewhat hooked. Preopercle with a few denticulations at rounded angle, opercle with two weak spines, posttemporal extended, fimbriate. Scales on head cycloid, largest on opercle in 5 to 6 oblique series, on body rather large, regular, ciliate; smallest predorsally, on chest and between ventrals and pectorals; lateral line arched to opposite origin of anal, sensory scales with fan-shaped divided tubes. Intermaxillaries with an outer row of conical, somewhat curved teeth and an inner villiform band; in mandibles an outer villiform series getting broader near symphysis, inside of it a short series of small conical ones. Spinous dorsal not deeply separated from soft dorsal, its base going 1½ times in base of latter, the spines rather strong and pungent, the third and fourth longest, with a filament, equal to snout and eye, higher than rather strong rays. Origin of anal opposite 8th dorsal ray, first spine minute, second very robust, as long as first ray, equal half head; base of anal nearly four times in that of soft dorsal; both fins bluntly rounded, their base scaly sheated. Pectorals pointed, as long as head without snout, ventrals equal postocular part of head, the spine strong, the first ray with a long filament surpassing vent. Caudal rhomboid, least height of its peduncle about equal eye diameter. Back greenish gray, sides and ventrally silvery, fins hyaline, dorsal dotted with brown. Length 235 mm. [The single specimen of Bleeker's collection in the Leiden Museum seen by us].

Habitat: Only one specimen known from Borneo (Banjermassin, river Barito!).

9. **Pseudosciaena soldado** (Lac.) (Fig. 102, p. 505)

Holocentrus soldado Lacépède, Hist. Nat. Poiss. IV, 1802, pp. 344, 389.
Corvina miles Cuvier, Règne Anim. éd. 2. II, 1829, p. 173.
Sciaena miles Cuvier & Valenciennes, Hist. Nat. Poiss. V, 1830, p. 94.
Sciaena argentea Cuvier & Valenciennes, Hist. Nat. Poiss. V, 1830, p. 71. (nec Forskål).
Corvina soldado Cantor, Cat. Malay. Fishes, 1850, p. 1052.
Corvina miles Bleeker, Verh. Batav. Gen. XXIII, (1849) 1850, p. 17.
Corvina Wolffii Bleeker, Nat. Tijdschr. Ned. Indië II, 1851, p. 66.
Corvina sampitensis Bleeker, Nat. Tijdschr. Ned. Indië III, 1852, p. 421.
Corvina celebica Bleeker, Nat. Tijdschr. Ned. Indië VII, 1854, p. 244.
Corvina dorsalis Peters, Monatsber. Akad. Berlin, 1855, p. 434.
Johnius miles Bleeker, Nat. Tijdschr. Ned. Indië XVIII 1859, p. 364.
Johnius soldado Bleeker, Nat. Tijdschr. Ned. Indië, XVII, 1858—1859, p. 145.
Corvina miles Günther, Cat. Brit. Mus II, 1860, p. 300.
Johnius celebicus Bleeker, Acta Soc. Sc. Indo-Néerl. VIII, 1860, p. 12.
Johnius miles Bleeker, ibidem.
Johnius Wolffii Bleeker, ibidem.
Johnius sampitensis Bleeker, ibidem.
Sciaena miles Jouan, Mém. Soc. Sc. Nat. Cherbourg XIII, 1867, p. 254.
Corvina miles Day, Proc. Zool. Soc. London 1869, p. 300.
Pseudosciaena miles Bleeker, Verh. Akad. Amsterdam XIV (1873) 1874. Mém. Sciénoides p. 25. — Atl. ichth. IX, 1877, Tab. 385, fig. 3.
Sciaena mülleri Steindachner, Denkschr. Akad. Wien XLI, 1879, p. 1.

Sciaena (Corvina) mülleri Klunzinger, Sitz. Akad. Wien 1880, p. 372.
Sciaena (Corvina) miles Klunzinger, ibidem.
Corvina argentea Macleay, Proc. Linn. Soc. N. S. Wales VIII, 1883, p. 204.
Umbrina mülleri Macleay, Proc. Linn. Soc. N.S. Wales IX, 1884, p. 23.
Corvina miles Macleay, ibidem.
Sciaena miles Day, Fish. India 4°, 1878—1888, p. 185. — Fish. Brit. India II, 1889, p. 113.
Corvina dorsalis Sauvage, Poiss. Madagascar, 1891, p. 350.
Corvina miles Duncker, Mitth. Naturhist. Museum Hamburg XXI, 1904, p. 154.
Sciaena miles Pellegrin, Bull. Soc. Zool. France XIII, 1905, p. 84.
Sciaena miles Lloyd, Rec. Ind. Mus. Calcutta I, 1907, p. 226.
Sciaena soldado Ogilby, Mem. Queensland Mus. VI, 1918, p. 81.
Sciaena soldado Barnard, Ann. S. African Mus. XXI 1925—27, p. 570.
Johnius soldado Fowler, Bull. U.S. Nat. Mus. XII, 1933, p. 392.

D. X, I, 28—30; A. II, 7; L.l. 50—52; L.tr. $\begin{array}{c}9\\ \hline 1\\ \hline 17\text{—}18\end{array}$.

Oblong, compressed; dorsal profile from snout to tail strongly convex, less so in adult, which have a slight concavity before and above eyes; ventral profile straight to anal. Height 3—4.1, head equal or somewhat more or less. Eye in anterior half of head, above horizontal through commencement of gape of mouth, 4.5—5.8 in head, about equal to flatly convex interorbital space, slightly shorter than snout, in adult 1,7 times in snout, which is pointedly convex, not prominent before mouth, has five pores on top and the free border on each side with a shallow emargination. Mouth terminal, oblique, the jaws nearly equal, the upper extending to hindborder of pupil or of eye. Maxillary concealed, its truncate expansion equals diameter of eye. Preopercle distantly denticulate, opercle with two weak spines, posttemporal finely and distantly ciliated. Posterior nostril round, close to eye, twice larger than valvulate anterior. Teeth in intermaxillaries in an inner narrow villiform series and an outer row of distant enlarged conical ones, in mandibles in an inner series of close-set conical ones and an outer single, incomplete villiform series, no canine-like teeth in jaws. Scales on head cycloid, rather large, on opercles in 5—6 rows, on top of head smaller and as otherwise ciliate; lateral line strongly arched to about middle of soft dorsal, sensory tubes strongly branched. Spinous dorsal deeply incised, third and fourth spine longest, less than half height of body, much higher than rounded soft dorsal, slightly increasing in height to posterior third and the base of which is nearly twice longer than spinous part. Anal obtusely rounded, originating opposite 9th to 10th dorsal ray, second anal spine very long and robust, in adult equal half head and nearly as long as first anal ray, base of anal more than thrice in that of soft dorsal. Both fins are scaly. Pectorals acutely rounded, longer than postocular part of head. Ventrals about $^1/_3$ shorter. Caudal wedge-shaped, more obtusely in young, least height of its peduncle more than thrice in length of head. Greenish brown or gray above, whitish on flanks and below with silvery reflections, paired fins and caudal yellowish, spinous dorsal with a dark margin, a dark spot behind each dorsal spine and ray. Length up to more than 600 mm.

Nom. indig.: Tigowodjo (Javan.), Tokotok (Madura).

Habitat: Pinang; Banka; Sumatra (river Batang Hari!, coast of Deli!); Java!; Bali; Borneo (Bandjermassin, Pemangkat, Singkawang, Sampit, Sebutie Isl.); Celebes (Makassar!, Badjoa). — Mozambique, Quillimane, Madagascar, British India, Ceylon, Indo-China, Southern China, Philippines, Queensland. In sea, brackish and freshwater of rivers.

10. **Pseudosciaena microlepis** (Blkr.)

Johnius microlepis Bleeker, Acta Soc. Sc. Indo-Neerl. V, 1858—1859, Sumatra p. 11. — Nat. Tijdschr. Ned. Indië XVI, 1858—1859, p. 389 (note).
Pseudosciaena microlepis Bleeker, Verh. Akad. Amsterdam XIV, (1873) 1874, Mém. Sciénoides, p. 23. — Atl. ichth. IX, 1877, Tab. 384, Fig. 3.
Johnius microlepis Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 406.

D. X, I, 31; A. II, 6; L.l. 51—54; L.tr. $\begin{array}{c}9\\ \hline 1\\ \hline 16\end{array}$.

Compressed, elongate; dorsal profile not elevated, little convex; rostro-dorsal contour above eyes somewhat concave. Height 4—4.1, head 3.3—3.5 in length. Eye situated in anterior half of head, somewhat above horizontal through commencement of gape of mouth, 4 to 5 in head, its diameter shorter than flat interorbital space and shorter than or about equal to convex not prominent snout, which has no apical pores, its free border with a superficial incision on each side, and between them slightly lobate. Mouth terminal, scarcely oblique, jaws subequal, the lower slightly shorter, included, with an indication of four symphysial pores; the upper jaw reaching middle of eye, maxilla concealed, its distal expansion truncate, equal half diameter of eye. Preopercle with rounded angle, weakly denticulate, opercle with two flat spines, posttemporal fimbriate. Scales small, on head cycloid, those on nape and body ciliate; lateral line slightly arched to opposite anal, the sensory tubes not much branched. Intermaxillaries with an outer row of distant, conical, enlarged teeth, with an edentulous median interspace and an inner villiform series; in mandibles an outer villiform band and an inner row of unequal distant, enlarged teeth of smaller size than the upper ones. Spinous dorsal shallowly separated from the soft, the base of which is about twice longer; third and fourth spine highest, about as long as postocular part of head and somewhat higher than rays which increase in height posteriorly. Base of anal nearly four times in that of soft dorsal, its origin opposite about 11th dorsal ray, the second spine stout, already in young 1½ eye diameter long and ¼ shorter than first ray. Pectorals roundly pointed, and ventrals, with a filamentous first ray, longer than postocular part of head. Caudal wedge-shaped, the median rays strongly prolonged in young; least height of rather long caudal peduncle equals eye. Silvery, back greenish or grayish, fins hyaline, dusky with brownish spots, opercle with a dark subcutaneous spot. Length up to 282 mm. [Specimen of Bleeker's collection in the Leiden Museum seen by us].

Nomen indig: Terusan (Palembang).

Habitat: Sumatra (Palembang, river Mussi!); Singapore. In sea.

Doubtful species

11. **Pseudosciaena borneensis** (Blkr.)

Otolithus borneensis Bleeker, Nat. Tijdschr. Ned. Indië I, 1850, p. 268.
Sciaena borneensis Günther, Cat. Brit. Mus. II, 1860, p. 294. (compiled).
Pseudosciaena borneensis Bleeker, Verh. Akad. Amsterdam XIV, (1873) 1874. Mém. Sciénoides p. 36. — Atl. ichth. IX, 1877, Tab. 385, fig. 4.
Johnius borneensis Seale, Philippine Journ. Sci. V, 1910, p. 279.
Johnius borneensis Fowler, Bull. U.S. Nat. Mus. XII, 1933, p. 379 (compiled).

D. X, I, 28 or 29; A. 7 or 8; L.l. about 40?; L.tr. $\frac{6}{\frac{1}{11-12}}$?

„Oblong, compressed; height about $3^{1}/_{3}$, head somewhat obtuse, slightly more than thrice in length. Eye about 3½ in head, equal interorbital space; rostro-frontal line nearly straight behind convex snout which is somewhat shorter than eye, has the free border on each side shallowly incised and no apical pores. Upper jaw slightly longer than lower, extending to posterior part of eye, about twice in length of head, mandible below symphysis with 2 not conspicuous pores. Teeth in jaws pluriseriate, in the intermaxillary an inner villiform series, the outer series distant, conical, of moderate size, diminishing posteriorly, anteriorly caninoid; in mandibles an outer villiform series; an inner series of conical distant inequal ones, shorter than the upper outer ones, no canines or caninoids. Gape of mouth moderately oblique. Preopercle weakly denticulate, opercle with two scarcely pungent spines; posttemporal ciliate; lateral line moderately arched, the sensory tubes arborescent; caudal peduncle about as long as high; scales on head cycloid, otherwise ciliate, on nape and predorsal small; between superior angle of branchial opening and caudal 45 scales above lateral line, below it 40; about 18 scales in transverse series between ventrals and dorsal, 6 of which between lateral line and spinous dorsal; dorsal between spinous and rayed part almost to base incised; spinous dorsal less than twice lower than body, longer than high, the spines slender flexible; rayed dorsal lower than spinous and about twice longer, only its basal half scaly; acute pectorals and ventrals and rhombic caudal longer than postocular part of head; anal obtusely rounded, its basal half scaly, twice lower than body, about 4 times in rayed dorsal, the spines strong, the second much more but much less than twice the longer, not much shorter than first ray. Colour above bluish- to greenish gray, on sides and inferiorly silvery, fins yellowish. Length of described specimen 92 mm." (After Bleeker).

Habitat: Borneo (Banjermasin). In river.

As the type in Bleeker's collection in the Leiden Museum is in bad state of preservation, we could not do better than to give a translation of Bleeker's description of his unique specimen to which we add that the eye is situated in the anterior half of the head and its lower margin in or slightly below the horizontal through the commencement of the gape of the mouth. According to Bleeker it is distinguished from other archipelagic species of *Pseudosciaena* with a strong second anal spine, by the large size of the scales or their low number. But is seems to us questionable to found a new species of a Sciaenoid on so young a specimen.

12. **Pseudosciaena plagiostoma** (Blkr.).

Corvina plagiostoma Bleeker, Nat. Tijdschr. Ned Indië I, 1850, p. 100.
Pseudosciaena plagiostoma Bleeker, Verh. Akad. Amsterdam XIV, (1873) 1874. Mém. Sciénoides p. 31. — Atl. ichth. IX, 1877, Tab. 385, fig. 1.
Johnius plagiostoma Fowler, Bull. U.S. Nat. Mus. XII, 1933, p. 402. (compiled).

D. X, I, 28—29; A. II, 7—8. L.l. ?; L.tr. ?.

Oblong, compressed, height $3^2/_3$, head somewhat obtuse $3^2/_3$ in length; eye 3 in head, about equal interorbital space. Rostrofrontal line convex; nostrils before pupil; snout obtuse, strongly convex, much shorter than eye, its free border nearly without incision, its apex without pores. Upper jaw nearly not longer than lower, extending to hindmargin of eye, about twice in length of head; lower jaw with 4—5 conspicuous pores below symphysis. Teeth in upper jaw pluriseriate, an inner villiform series and an outer series of unequal distant ones of moderate size, hindwards getting shorter; in mandibularies an outer villiform series and an inner series of unequal distant conical ones forming a shorter series than above; no canines or caninoids. Gape of mouth strongly oblique; preopercle posteriorly denticulate, opercle with 2 weak spines, posttemporal fimbriate. Lateral line moderately arched; caudal peduncle about as long as high. Scales (cycloid on head?), on body ciliate, between upper angle of branchial opening and caudal above l.l. 60?; 6? scales between l.l. and spinous dorsal. Dorsal between spinous and rayed part nearly to base incised; spinous dorsal less than twice lower than height of body, much longer than high, the spines slender, flexible; soft dorsal lower than spinous but twice longer; pectorals and ventrals acute, caudal rhomboid, pointed, not or slightly shorter than head without snout; anal obtusely convex, less than twice lower than body, about 4 times in soft dorsal, the spines valid, the first short, the second much but much less than twice longer. Colour above bluish-or-greenish-gray, on sides and below silvery, fins yellowish. Length of the 2 known specimens 72 and 90 mm. (Translated from Bleeker's diagnosis).

Habitat: Singapore; Java (Surabaja); Madura in sea.

Note. We have given above a translation of Bleeker's description of the present species which we placed as a doubtful one as it is based on two young specimens which have lost most of their scales on head and body.

5. **Johnius** Bloch (p.p.)

(Bloch, Ausländische Fische VII, 1739, p. 132. Type *J. carutta* Bloch).

Corvina Cuvier, Règne Anim. éd. 2. II, 1829, p. 173.
Johnius Cuvier & Valenciennes, Hist. Nat. Poiss. V, 1830, p. 115 (p.p.).

Oblong, compressed; covered with small or moderate scales, usually cycloid on opercles, cheeks and suborbitals, otherwise ciliate or totally or partly cycloid; lateral line arched, sensory scales not enlarged or squamate, the tubes fan-shaped or much less branched. Snout bluntly rounded or inflated, more or less prominent before jaws, its free border overhanging, entire or lobate, with or without apical pores. Mouth inferior, its gape not wide, slightly oblique or subhorizontal. Upper jaw protractile, overlapping the lower, which is included and has 5 mental pores but no barbel. Teeth in jaws in villiform bands, subequal in mandibularies, in intermaxillaries the outer series conical enlarged, no canines or caninoids. Spinous dorsal by deep or shallow incision separated from soft dorsal, the VIII to X spines flexible or rigid, much lower than height of body; the highest, generally the second and third, surpassing height of rounded soft dorsal, which has 22 to 34 rays. Anal 3—4 times in base of soft dorsal; both fins basally or nearly entirely scaled. Anal II, 6—9, the second spine slender and short or robust and long and equalling half length of head. Caudal wedge-shaped or rounded.

Distribution: Tropical and subtropical carnivorous fishes of medium or large size, living in sea, estuaries, some entering rivers, of the Indo-australian Archipelago, Philippines, coasts of India, to China, Australia, East-coast of Africa and some species in tropical Atlantic. Generally valued as food and for the manufacturing of isinglass.

Key to the indo-australian species of Johnius

I. Ciliae of the ciliate scales on dorsal part of head and on ventral surface brushlike erected . . . . 1. *J. jubatus* p. 527.
II. Scales when ciliate normal.
  A. Scales on head and body cycloid. Dorsal rays 24—28; spinous D. twice in soft. 2. anal spine slender, 1½ eye . . . 2. *J. trachycephalus* p. 528.
  B. Scales on head, at least on opercles, cheeks and suborbitals cycloid, otherwise ciliate.

a. Second anal spine weak and short, twice eye or less.
  1. D. 25—28 . . . . 3. *J. carutta* p. 529.
  2. D. 28—30; spinous D. about twice in soft; origin of anal opposite middle of soft D. . . . . 4. *J. dussumieri* p. 530.
  3. D. 34; spinous D. more than 2½ in soft; origin of anal opposite 15. dorsal ray . . . . 5. *J. hypostoma* p. 532.

b. Second anal spine robust, equal half head or longer.
  α. Eye totally in anterior half of head.
    1. D. 28—30; spinous D. deeply incised; origin of anal opposite 12.—13. dorsal ray; free border of snout deeply quadrilobate . 6. *J. belengeri* p. 533.
    2. D. 27—31; spinous D. shallowly notched; origin of anal opposite 8.—9. dorsal ray; free border of snout superficially lobate . . . 7. *J. semiluctuosus* p. 535.
  β. ¾ diameter of eye in anterior half of head; D. 25; origin of anal opposite 10. dorsal ray . . . . . . 8. *J. novae-hollandiae* p. 537.
    Doubtful species as to their synomy and locality . . . . 9. *J. maculatus* p. 538.
    10. *J. osseous* p. 541.

1. **Johnius jubatus** (Blkr.)

Corvina jubata Bleeker, Nat. Tijdschr. Ned. Indië, VIII, 1855, p. 160.
Johnius jubatus Bleeker, Acta Soc. Sc. Indo-Neerl. VIII, 1860, Sumatra p. 23. — opus citat. Borneo, p. 12.
Corvina jubata Günther, Cat. Brit. Mus. II, 1860, p. 305 (compiled).
Johnius jubatus Bleeker, Verh. Akad. Amsterdam XIV, (1873) 1874, Mém. Sciénoides p. 52. — Atl. ichth. IX, 1877, Tab. 377, fig. 5.
Corvina jubata Blkr.(?) Duncker, Mitth. Naturh. Mus. Hamburg XXI, 1904, p. 154.
Johnius jubatus Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 399. — Proc. Nat. Sci. Philadelphia LXXXVI, 1934, p. 154.

D. X, I, 23; A. II, 8; L.l. 48; L.tr. ca $\begin{array}{c}11\\\hline 1\\\hline 18\end{array}$.

Compressed, oblong; dorsal profile nearly straight from snout to dorsal, thence convex to caudal peduncle, less so ventrally. Height about equal length of head, 3.1 in length. Eye situated in anterior half of head, high up near dorsal profile, about 5 in head, somewhat less than twice in flat interorbital space, still less in very blunt, swollen, slightly prominent snout, which has on each side a lateral incision and between them a lobate, somewhat prominent portion, above on apex 3 to 5 not always visible pores. Preopercle, principally at its rounded angle, spiniferous, opercle with two flat not-pungent spines, posttemporal fimbriate. Mouth inferior, upper jaw the longest, shorter than postocular part of head, extending to middle of eye; maxilla concealed, its distal expansion strongly rounded, shorter than eye; lower jaw included, gape of mouth small, horizontal, below symphysis 4—5 pores. Scales generally small, on suboculars, cheeks and opercles cycloid, on dorsal part of head from snout to dorsal fin rough by the erect, hairlike ciliae of the ciliate scales, ventral scales to anal strongly ciliate, part of the ciliae also errect but less than on front; other scales on body cycloid, small above lateral line which is rather strongly arched to opposite origin of anal. Teeth in intermaxillaries in a villiform band and an outer row of somewhat enlarged curved teeth; in mandibles in a broad villiform band. Dorsal nearly to its base incised; base of spinous dorsal 1½ times in that of soft dorsal, spines flexible, the fourth and fifth subequal and highest, less high than 1½ length of eye diameter, about equal snout and about as high as dorsal rays. Dorsal and anal rounded and with scaly base. Origin of anal opposite about 11th dorsal ray, its base nearly thrice in that of soft dorsal, the second spine weak, short, shorter than eye and half of first ray. Pectorals rounded, equal postocular part of head; ventrals pointed slightly shorter, first ray longest. Caudal rhombic, least height of its peduncle equal interorbital space. Silvery, darker on back, spinous dorsal with a dark margin, otherwise yellowish; opercle with a dark spot. Length up to 175 mm. [Specimen of Bleeker's types seen in the Leiden Museum].

Habitat: Sumatra (Palembang); Borneo (Bandjermasin). — Malay Peninsula; in rivers.

2. **Johnius trachycephalus** (Blkr.)

Corvina trachycephalus Bleeker, Nat. Tijdschr. Ned. Indië, I, 1850, p. 269. — opus cit. II, 1851, p. 200.

Sciaena trachycephalus Günther, Cat. Brit. Mus. II, 1860, p. 293. (compiled).

Johnius trachycephalus Bleeker, Acta Soc. Sc. Indo-Neerl. VIII, 1860, p. 23. — Verh. Akad. Amsterdam XIV, (1873) 1874, Mém. Sciénoides p. 41. — Atl. ichth. IX, 1877, Tab. 386, fig. 1.

Johnius trachycephalus Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 406. (compiled).

D. VIII—IX, I, 24—28; A. II, 6; L.l. 50—51; L.tr. 8—9 between spinous dorsal and L.l.

Compressed, elongate; dorsal profile somewhat convex, profile of head above eyes concave. Height 4.4, head 5 in length. Eye 4.5 in head, situated in anterior half of head, equal to flat interorbital space, somewhat shorter than inflated, bluntly rounded snout, overhanging the upper jaw, without visible pores, the free border with a shallow incision on each side. Mouth inferior, slightly oblique; upper jaw overlapping the lower, extending to middle of pupil; maxillary concealed, its distal expansion truncately rounded, broader than half eye diameter; mandibulary included, with 5 mental pores. Preopercle posteriorly weakly dentate, opercle with two non-pungent spines, posttemporal fimbriate. Scales cycloid, on head and body small, smallest on nape and anteriorly above lateral line, regularly arranged, present on base of vertical fins; lateral line flatly arched to before anal, the sensory tubes slightly branched. Teeth in villiform bands; only in intermaxillaries the outer series somewhat larger. Spinous dorsal deeply incised, its base twice in that of soft dorsal, spines rigid to flexible, second and third the highest, shorter than half length of head, surpassing height of rays; base of anal four times in that of soft dorsal, its origin opposite about 10th dorsal ray; second spine slender, nearly as long as 1½ eye diameter, shorter than first anal ray. Pectorals and ventrals pointedly rounded, longer than postocular part of head. Caudal rhomboid, least height of its peduncle nearly equal eye. Dorsally grayish, on sides and belly more or less silvery, fins yellowish, brownish dotted.

Length 130 mm. [Specimen of Bleeker's collection in the Leiden Museum seen by us].

Habitat: Sumatra (Palembang); Borneo (Bandjermasin, Samprit, Sambas). In rivers.

3. **Johnius carutta** Bloch

Johnius carutta Bloch, Ausl. Fische VII, 1793, p. 133. — Bloch, Schneider, Syst. Ichth. 1801, p. 74.

Labrus carutta Lacépède, Hist. Nat. Poiss. III, 1802, p. 447.

Corvina carutta Cuvier & Valenciennes, Hist. Nat. Poiss. V, 1830, p. 124.

Corvina carouna Cuvier & Valenciennes, loc. cit. p. 125.

Johnius carutta Cantor, Cat. Malayan Fish. 1850, p. 1048.

Corvina carutta Rüppell, Samml. Senckenberg. Mus. 1852, p. 8.

Corvina carutta Günther, Cat. Brit. Mus. II, 1860, p. 302.

Corvina carutta Day, Fish. Malabar, 1865, p. 51.

Johnius carutta Bleeker, Verh. Akad. Amsterdam, XIV, (1873) 1874, Mém. Sciénoides p. 48, (compiled). — Arch. Néerland. Sc. Nat. XI, (1875) 1876, p. 327.

Sciaena carutta Day, Fish. India 4°. 1878—1888, p. 192. — Fish. Brit. India II, 1889, p. 122.
Corvina carutta Duncker, Mitth. Naturhist. Mus. Hamburg, XXI, 1904, p. 154.
Johnius carutta Jordan & Seale, Proc. Davenport Acad. Sci. X, (1905) 1907, p. 11.
Johnius carutta Jordan & Starks, Ann. Carnegie Mus. XI, 1917, p. 453.
Johnius carutta Fowler, Journ. Bombay Nat. Hist. Soc. XXX, 1926, p. 10.
Sciaena carutta Hardenberg, Treubia, XIII, 1931, p. 133.
Sciaena carutta Chevey, Invent. faune ichth. Indochine 1932, p. 22.
Johnius carutta Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 384.
Johnius carutta Hardenberg, Treubia, XIV, 1934, p. 309.

D. X, I, 25—28; A. II, 7; L.l. 50; L. tr. $\begin{array}{c}5\text{—}6\\ \hline 1\\ \hline 18\end{array}$.

Height $3^{1}/_{2}$ to 4, head $4^{1}/_{3}$ to $4^{1}/_{2}$ in total length. Eye 4 to $5^{1}/_{4}$ in length of head, $1^{1}/_{4}$ from end of snout and also apart. Snout inflated, overhanging the upper jaw, which slightly overlaps the lower; distance between eye and upper edge of maxilla equals diameter of orbit; cleft of mouth nearly horizontal; maxillary reaches $^{3}/_{5}$ in eye, length $2^{3}/_{4}$ to 3 in head; 5 pores on chin. Preopercle crenulated, more especially along its lower border; opercle with two weak spines. A row of pores across the snout; 5 along edge of free border, and a lateral lobe. Teeth in jaws in villiform bands, only upper outer row enlarged. Dorsal spines weak, second and third the longest, $^{1}/_{3}$ higher than rays and $^{1}/_{2}$ height of body; outer ventral ray, elongate. Second anal spine weak, nearly $^{2}/_{3}$ as high as first ray, and $^{2}/_{7}$ to $^{2}/_{5}$ length of head. Caudal rhomboidal, least height of caudal peduncle $3^{1}/_{2}$ to $3^{4}/_{5}$ in head. The series of scales run rather obliquely upward both above and below the lateral line. The membrane of the soft dorsal is inconspicuously scaled nearly or quite to its outer edge. Purplish brown from the presence of numerous fine dots, but becoming golden in lower fourth of body; lateral line generally lighter than contiguous parts. Head glossed with purple. First dorsal fin dark, the others with grey edges. Attaining nearly a foot (305 mm) in length (Day). [Not seen by us].

Habitat: Pinang; Sumatra (Mouth of Rokan). — British India, Ceylon, Cochin China, Southern China.

4. **Johnius dussumieri** (C.V.)

Corvina dussumieri Cuvier & Valenciennes, Hist. Nat. Poiss. V, 1830, p. 119.
Johnius dussumieri Cantor, Catal. Malay. Fishes 1850, p. 1046.
Corvina dussumieri Bleeker, Nat. Tijdschr. Ned. Indië, III (1851) 1852, p. 56. — Verh. Akad. Amsterdam XIV (1873), 1874, Mém. Sciénoides, p. 49.

Sciaena glaucus Day, Fish. India 4°. 1878—1888, p. 192.
Sciaena glauca Day, Fish. Brit. India II, 1889, p. 122.
Sciaena dussumieri Duncker, Mitth. Nat. Mus. Hamburg, XXI, 1904, p. 154.
Sciaena glaucus Pellegrin, Bull. Soc. Zool. France, XIII, 1905, p. 84.
Sciaena glauca Hardenberg, Treubia, XIII, 1931, p. 32.
Johnius glaucus Fowler, Proc. Acad. Philadelphia (1931) 1932, p. 447.
Johnius dussumieri Fowler, U. S. Nat. Mus. XII, 1933, p. 398.
Sciaena dussumieri Hardenberg, Treubia XIV, 1934, p. 309.

D. X, I, 28—30; A. II, 8; L.l. ca 50; L.tr. $\begin{array}{c} 5 \\ \hline 1 \\ \hline 10-12 \end{array}$.

Oblong, dorsal profile slightly convex from snout to caudal peduncle, ventral profile more convex; height 3.25 in specimens of 200 mm, head 3.3, its profile ascending in a slightly convex line. Eye 4.2, far above horizontal through commencement of cleft of mouth, distance from upper jaw equal to $^3/_4$ of its diameter, which equals flatly convex interorbital space and goes 1.4 in bluntly rounded, swollen, prominent snout, the free border of which is mesially quadrilobate, the outer lobes the largest. Anterior nostril rounded, valvulate, the much larger posterior close to middle border of eye, anteriorly with a flap. Mouth nearly horizontal, inferior, lips thick, velvety, upper jaw much longer, reaching hindborder of pupil; maxillary concealed, its distal expansion truncate, equal to half eye diameter; mandibula included, below symphysis a median pore and two lateral on each side separated by thick folds of velvety skin, often two others behind them, usually all fissure-like. Preopercle distantly crenulated, strongest on rounded angle; opercle with two flat weak spines. Posttemporal fimbriate. In intermaxillaries an outer series of distant small conical teeth, anteriorly enlarged, and an inner villiform band, in mandibularies an anteriorly broad villiform band, narrowing posteriorly. Scales cycloid on cheeks, preopercle and opercle, otherwise ciliated; lateral line slightly arched to below middle of soft dorsal, the tubes distally bifid. Dorsal deeply incised, base of spinous part about half of base of soft part; third and fourth spine highest, about 2½ times in length of head; somewhat higher than dorsal rays. Origin of anal below middle of soft dorsal, its rather weak second spine shorter than eye, about half length of first ray. Dorsal and anal rounded. Pectorals pointed, somewhat shorter than head without snout, ventrals about equal postocular part of head, the first ray filamentous, prolonged. Caudal rounded, somewhat cuneate, least height of its peduncle longer than eye. In alcohol brownish, back darker, belly lighter, upper half of spinous dorsal blackish, distally more intense, upper half of soft dorsal darker; base of pectorals with a small dark patch. Length 200 mm, after Day attaining a large size.

Habitat: Pinang; Singapore; Sumatra (Mouth of Rokan). — British India, Ceylon, Malay Peninsula!, Tonkin, Southern China. In sea and brackish water.

5. **Johnius hypostoma** (Blkr.)

Corvina hypostoma Bleeker, Nat. Tijdschr. Ned. Indië V, 1853, p. 499.
Johnius hypostoma Bleeker, Act. Soc. Sc. Indo-Neerl. VIII, 1860, Sumatra, p. 23.
Sciaena hypostoma Günther, Cat. Brit. Mus. II, 1860, p. 293. (compiled).
Johnius hypostoma Bleeker, Verh. Akad. Amsterdam, XIV, (1873) 1874, Mém. Sciénoides p. 42. — Atl. ichth. IX, 1877, Tab. 384, fig. 2.
Johnius hypostomus Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 397.

D. IX, I, 34; A. II, 7; L.l. ca. 43; L.tr. $\begin{array}{c}4-5\\ \hline 1\\ \hline \text{ca. } 8-9\end{array}$.

Compressed, oblong; rostro-dorsal line ascending in a straight line to origin of dorsal, which is the highest point, thence descending in a nearly straight line to caudal peduncle. Height slightly more than head, 3.26 in length. Eye in anterior half of head, high up, near dorsal profile, 4.8 in head, nearly 1½ in flat interorbital space, its diameter shorter than obtuse, convex, prominent snout without pores, the free border on each side with a superficial lateral incision. Mouth inferior, the gape small, nearly horizontal, upper jaw 2½ in head, reaching behind middle of eye, maxilla concealed, its truncate expansion about half diameter of eye. Preopercle with rounded angle, posteriorly denticulate, opercle with two flat non-pungent spines, post-temporal ciliate. Scales rather large, ciliate on body as also the smaller nuchal and predorsal ones, otherwise on head cycloid; lateral line arched to origin of anal, the sensory tubes arborescent. Teeth in villiform narrow bands, the outer intermaxillary series somewhat enlarged. Dorsal deeply incised to near base. Base of spinous dorsal more than 2½ times in that of soft dorsal; spines slender, the second, third and fourth subequal, the third about as long as snout and eye, higher than rays. Anal originates opposite 15th dorsal ray, its base goes more than four times in that of soft dorsal, the second spine is rather short, twice diameter of eye and not much shorter than first ray. Pectorals and ventrals pointed, about equal head. Caudal wedge-shaped, least height of caudal peduncle twice diameter of eye. Greenish above, silvery below, opercle with a diffuse violet patch; fins yellowish, generally more or less dusky with fuscous dots. Length up to 115 mm. [Specimen of Bleeker's collection in the Leiden Museum seen by us].

Habitat: Sumatra (Padang, Benkulen, Tiku, Trussan (in sea.

6. **Johnius belengeri** (C.V.)

(Fig. 98, p. 483; 99, p. 486; 104, p. 534)

Corvina belengerii Cuvier & Valenciennes, Hist. Nat. Poiss. V, 1830, p. 120.
Corvina Kuhlii Cuvier & Valenciennes, loc. cit. p. 121.
Corvina lobata Cuvier & Valenciennes, loc. cit. p. 122.
Corvina Belangerii, Valenciennes in Bélanger, Voy. Indes Orient. Zool. II, 1834, p. 358.
Johnius Belengeri Bleeker, Nat. & Geneesk. Arch. Ned. Indië, (3), II, 1845, p. 523.
Corvina Kuhlii Bleeker, Verh. Batav. Gen. XXIII, (1849) 1850, p. 18.
Johnius belengeri Cantor, Cat. Malay. Fish. 1850, p. 1047.
Corvina lobata Bleeker, Verh. Batav. Gen. XXV, 1853, Fauna Bengal. p. 36.
Corvina belangeri Günther, Cat. Brit. Mus. II, 1860, p. 303.
Corvina lobata Günther, loc. cit. p. 304.
Johnius belangeri Bleeker, Versl. Akad. Amsterdam XII, 1861, pp. 49, 72.
Corvina belangeri Day, Fish. Malabar 1865, p. 54.
Johnius belangeri Kner, Novara-Exp. Fische 1865, p. 133.
Sciaena (Corvina) belangeri Steindachner, Verh. Zool. Botan. Ges. Wien XVI, 1866, p. 771.
Corvina belengeri Day, Proc. Zool. Soc. London 1870, p. 684.
Johnius belengeri Bleeker, Verh. Akad. Amsterdam, XIV, (1873) 1874, Sciénoides, p. 46. — Atl. ichth. IX, 1877. Tab. 387, fig. 1.
Sciaena belengeri Day, Fish. India 4°. 1878—1888, p. 120. — Fish. Brit. India II, 1889, p. 120.
Corvina belangeri Duncker, Mitth. Nat. Mus. Hamburg XXI, 1904, p. 154.
Johnius belengeri Evermann & Seale, Bull. Bur. Fish. XXVI, 1906, p. 87.
Sciaena belengeri M. Weber, Nova Guinea IX, Zool. 1913, p. 588.
Sciaena belangeri Regan, Trans. Zool. Soc. London, XX, 1914, p. 276.
Sciaena belengeri Barnard, Ann. S. Afric. Mus. XXI, 1925—27, p. 572.
Johnius belangeri Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 235.
Johnius belengeri Herre, Notes Fish. Zool. Mus. Stanford Univers. 1931, p. 57.
Sciaena belengeri Hardenberg, Treubia XIII, 1931, p. 131.
Johnius belengeri Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 382. — Proc. Acad. Nat. Sci. Philadelphia LXXXVI, 1934, p. 153.
Johnius belengerii Hardenberg, Treubia XIV, 1934, p. 309.
Johnius belengeri Lin, Bull. Chekiang Fish. Stat. I, 1935, p. 13.

D. IX—X, I, 28—30; A. II, 7—8; L.l. about 50; L.tr. $\begin{array}{c}7-8\\ \hline 1\\ \hline 13-14\end{array}$.

Oblong, posteriorly compressed; height in adult about equal to head, which goes 3.3—3.6 in length. Its fronto-dorsal profile ascending nearly in a straight line. Eye 3.5—6 in head, situated in its anterior half, in young about equal to, in adult 1.5 in convex interorbital space, in adult 1.7 in snout, in young about as long as snout. Posterior nostril an oval slit close to frontborder of eye, the anterior round and much smaller. Snout obtuse, convex, somewhat swollen, prominent before upper jaw, its free border with a central pore, on each side two incisions, the lateral one deepest, both separating a small triangular lobe, between them two smaller ones, making the centre of the upper lip quadrilobate, above it on top of snout a transverse series of three small pores, chin with five pores. Cleft of inferior mouth nearly horizontal, lower jaw included, upper reaching hindborder of pupil; upper border of maxillary slipping under suborbital, its distal end broader than half length of pupil. Teeth in villiform bands, in the lower jaw uniform, in the upper the outer row enlarged and distant. Operculum with two flat weak spines, preopercle serrulate at its vertical limb, posttemporal crenulate. Scales wanting only on apex of snout and jaws, round eye, on opercles and on base of vertical fins not ciliated, otherwise ciliated, the nuchal and anterior dorsal ones smaller; lateral line in its anterior half arched, the sensory tubes arborescent. Spinous part of dorsal separated nearly to base from soft part, the base of the former nearly two times in that of the latter, which is scaly and less high than the former, the third spine the highest being about half height of body in adult. Both parts with a scaly basal sheath. Anal about four times shorter than soft dorsal, the first spine short, the second very strong, about twice eye diameter, in adult (male?) more than thrice; origin of anal opposite 12th to 13th dorsal spine, ist base scaly. Pectorals acutely rounded, about length of head without snout, ventrals pointed, the first ray with a filament of some length. Axillary scaly process present. Caudal wedgeshaped, least height of its peduncle more than length of snout. Brown to grayish above, silvery below as also head. Our specimens from New-Guinea have longitudinal obliquely ascending rows of dark spots on scales, regular on back, less so on flanks, more pronounced in a fullgrown specimen; in younger specimens the scales are so closely dotted with black and brown as to impart a general pale brownish appearance; spinous dorsal, anal, ventrals and terminal half of caudal blackish.

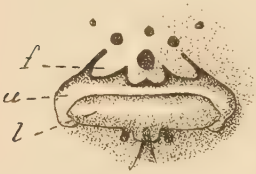

Fig. 104. Frontal view of opening of mouth of *Johnius belengeri* C.V. f. border of snout with central pore in quadrilobate lobe overhanging on u upper lip, and pores on apex of snout. l lower lip with 2 of the symphysial pores.

Length up to 300 mm.

Nomen indig.: Tigowodjo (Javan.); Kekemeh (Sundan).

Habitat: Pinang; Singapore; Banka; Sumatra (Rokan river, Deli!, Pulu Weh!); Simalur!; Nias; Java (Batavia!); Borneo!; Sula Isl.!; New Guinea (Mimika river, Lorentz river!, Varen river!); — Natal coast, British India, Andamans, Malay Peninsula, Bangkok, Southern China, Philippines.

Note: We have united *Corvina lobata* C.V. with the present species as it got probably its name from "la lèvre membraneuse au-devant du mus au qui se divise en quatre petits lobes bien marqués", as is characteristic for *belengeri*. Kner, without taking notice of this character, united them also; Bleeker however, though he gave a good description of the quadrilobate upperlip in his diagnosis of *belengeri*, refuted Kner and their identity, as the young specimens lacked the five triangular dark dorsal bands described by Cuvier in the young specimens, the only of which he disposed. Barnard says about his specimens from Natal "often some dark blotches on back (lobata)". In the collection of the Amsterdam Museum we have a 150 mm long example of *J. belengeri* which, though bleached, shows an indication of the triangular dark dorsal blotches depicted in the figure of *Corvina lobata* C.V.

7. **Johnius semiluctuosus** (C.V.)

Corvina semiluctuosa Cuvier & Valenciennes, Hist. Nat. Poiss. V, 1830, p. 106.
Corvina semiluctuosa Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3), II, 1845, p. 522.
Corvina semiluctuosa Günther, Cat. Brit. Mus. II, 1860, p. 304.
Johnius semiluctuosa Kner, Novara-Exp. Fische 1865—1867, p. 124.
Johnius semiluctuosus Bleeker, Verh. Akad. Amsterdam, XIV, (1873) 1874, Mém. Sciénoides p. 54.
Corvina semiluctuosa Peters, Monatsber. Akad. Berlin (1880) 1881, p. 922.
Sciaena semiluctuosa Day, Fish. India 4°, 1878—1888, p. 191. — Fish. Brit. India 1889, p. 121.
Corvina semiluctuosa Duncker, Mitth. Naturh. Mus. Hamburg XXI, 1904, p. 154.
Johnius semiluctuosus Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 404. (salve synonyma).

D. X, I, 28—31; A. II, 7; L.l. 52; L.tr. $\begin{array}{c} 6-8 \\ \hline 1 \\ \hline 13-15 \end{array}$.

Oblong, rostro-dorsal profile strongly ascending in nearly straight line to dorsal, thence much more convex than ventral, height about equal to length of head, 3.1 to 3.5 in length. Eye 4.5 to six in head, situated in anterior half of head and above horizontal through commencement of gape of mouth, equal to or $^1/_3$ shorter than slightly convex interorbital space and 1 or 2 diameters from end of little inflated prominent snout, which has three open pores across its base and five more along its free border, mesially lobate with shallow lateral incision. Mouth nearly horizontal, inferior; upper jaw the longest, reaching to below hindborder of pupil; maxillary concealed with distal rounded expansion, shorter than eye; mandibulary included with five pores under symphysis. Preopercle with rounded angle, crenulate, opercle with two blunt spines. Teeth in villiform bands and a superior outer row of distant enlarged ones of moderate size and number. Scales ctenoid except below eyes, on cheeks and opercles where they are cycloid; skin of snout velvety; base of soft dorsal thickly scaled; lateral line arched to above end of anal, sensory tubes with short fan-shaped branches, posteriorly bifid. Dorsal only superficially notched, the four last spines of about equal height and about half height of the third, the longest, being $^1/_3$ higher than the rays, and equal to half or a third height of body; spines rigid, depressible in a groove. Base of spinous dorsal more than twice in soft dorsal, which even as anal is rounded, second anal spine long and robust, about half length of head. Anal more than thrice in length of soft dorsal, originating opposite 8. to 10. dorsal ray. Pectorals rounded, longer than postorbital part of head, ventrals with first ray filamentous. Caudal rounded to slightly rhomboidal, least height of its peduncle nearly twice eye. Ground colour silvery to deep grey with blackish oblique bands running up- and hindwards along the centre of each row of scales of trunk and tail, fainter in young; fins deep black, head glossed with purple. Length up to 350 mm.

Habitat: Java (Batu Ulu, south coast of east Java!); Sumatra (Pulu Weh!). — British India, Belutschistan, Malay Peninsula, Philippines.

In sea.

Note: Fowler unites with the present species *Corvina fauveli* Sauvage (Bull. Soc. Philomat. Paris (7) V, 1881, p. 105) from Swatow, China. This species, also recognised by Rutter (Proc. Acad. Nat. Sci. Philadelphia 1897, p. 76), is however easily to distinguish. It differs f.i., contrary to *semiluctuosus*, by a deep notch separating the spinous and soft dorsal; the first species has the third spine longest, in our specimen of 225 mm length from Tintsin, China, 27 mm against 9—8 mm in the last spines, the rays being 20 mm high. Preopercle denticulate with coarse teeth at the rounded angle. Pectorals not rounded but acutely pointed and longer than head without snout. Gray above with silvery hue, whitish below, rather faint oblique lines, darker above lateral line. Fins not deep black but only spinous dorsal blackish, other fins hyaline; at base of each dorsal spine and ray a conspicuous, somewhat lengthy black spot; a blackish opercular patch.

There exists besides a remarkable nomenclatorial question about this fish. Peters (Monatsber. Akad. Berlin (1880) 1881, p. 922) described from Ningpo, China, a fish he named *Otolithus Fauvelii,* which is identical *Corvina Fauvelii* Sauvage; the only difference is, that Peters counts in the lateral line 50, Sauvage 68 scales, we count 55 but that may depend on the way of counting, so easily to differ in Sciaenidae. Seeing that the communication of Peters is from November 4, 1880, that of Sauvage from May 14, 1881, Peter's paper, overlooked by later authors (Sauvage, Rutter, Fowler), has priority. The remarkable independent use of the same specific name by both authors may be explained by the supposition that Fauvel, a functionary of the Chinese marine Customs, collected for Berlin and Paris.

8. **Johnius novae-hollandiae** (Steind.)

Sciaena (Corvina) novae-Hollandiae Steindachner, Sitzber. Akad. Wien 1866, p. 445.
Johnius novae-hollandiae Bleeker, Verh. Akad. Amsterdam XIV, (1873) 1874, Mém. Sciénoides p. 44. — Atl. ichth. IX, 1877, Tab. 387, fig. 2.
Corvina comes de Vis, Proc. Linn. Soc. N. S. Wales IX, 1884, p. 538.
Sciaena novae-hollandiae Fowler, Proc. Acad. Nat. Sci. Philadelphia (2), LVII, 1905, p. 501.
Pseudomycterus maccullochi Ogilby, Proc. Roy. Soc. Queensland XXI, 1907, p. 10.— 1908, p. 96.
Sciaena novae-hollandiae Ogilby, Mem. Queensland Mus. VI, 1918, p. 79.
Johnius novae-hollandiae Vinciguerra, Ann. Museo Civ. Storia Nat. Genova (3), 1926, p. 576.
Johnius novae-hollandiae Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 383.

D. X, I, 25; A. II, 7—8; L.l. 49—50; L.tr. $\begin{array}{c}7\\\hline 1\\\hline 12-13\end{array}$.

Oblong, dorsal profile much more arched than the ventral, height slightly less than head, which goes 3.3 to 3.5 in length. Eye 3.5 to 4 in head, longitudinally elliptical, somewhat shorter than flatly convex interorbital space, for $^3/_4$ of its length situated in anterior half of head and its lower margin above horizontal through commencement of cleft of mouth; about equal to bluntly rounded, somewhat swollen snout, which projects beyond jaws and is about equal to $^1/_3$ of head. Preopercle denticulate, the small blunt teeth progressively gaining in distance and strength toward rounded angle, opercle with two weak spines. Scales of cheeks and opercles cycloid, otherwise, also on dorsal part of head, ctenoid; base of soft dorsal and anal scaly; lateral line arched concurrent with dorsal profile, sensory tubes with an ascending and descending branch not reaching to border of scale. Mouth inferior, slightly oblique, upper jaw much the longer, extending to below frontborder of pupil; maxillary concealed, its expansion rounded, about the width of pupil. Intermaxillaries with an outer series of slightly longer and stronger teeth than the inner villiform ones; in mandibles a broad villiform band, narrowing posteriorly. Spinous dorsal originating above base of pectorals, not deeply separated from the rayed part, its base longer than half length of latter; spines rather strong, the second and third longest, about half length of head; the rays getting higher from middle of soft dorsal and attaining height of longest spine. Origin of anal opposite 10th dorsal ray, second spine long, equalling half length of head and length of first anal ray. Pectorals acute, about equal head without snout, ventrals of same length with the first spine filamentous; caudal cuneate, least height of its peduncle equal diameter of eye. Colour according to kind of preservatives silvery to light brown with microscopic brown dots; fins duskey. Length about 300 mm.

Habitat: Sumatra (Padang); Borneo (Serawak, Bandjermasin). — Australia (Port Jackson, Brisbane River, Logan River). In sea and rivers.

Doubtful species as to their synonymy and locality

9. **Johnius maculatus** Bloch, Schneider

Johnius maculatus Bloch, Schneider, Syst. ichth. 1801, p. 75.
Corvina maculata Cuvier & Valenciennes, Hist. Nat. Poiss. V, 1830, p. 126.
Johnius maculatus var. Cantor, Cat. Malay. Fishes 1849, p. 68. (Day remarks [1]).

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[1] "The species termed *Johnius maculatus*, var. by Cantor, (Catal. p. 68), is still present in the British Museum, it has been termed by Bleeker (Mém. Scién. 1874, p. 51) *J. Cantori*. I would here add to Cantor's description the following remarks from his type. Height of head equals its length excluding the snout: the distance from the eye to the upper jaw equals three-fourths of a diameter of the orbit. *Teeth* — an enlarged outer row in the upper jaw: solely villiform ones in the lower. *Fins* — longest spines of first dorsal fin

Johnius cantori Bleeker, Verh. Akad. Amsterdam XIV, (1873) 1874. Mém. Sciénoides p. 51.
Sciaena maculata Günther, Cat. Brit. Mus. II, 1860, p. 291.
Sciaena maculata Day, Fish. India 4° 1878—1888, p. 190. — Fish. Brit. India II, 1889, p. 119.
Johnius maculatus Jordan & Starks, Ann. Carnegie Mus. XI, 1917, p. 453.
Johnius maculatus Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 380.

D. X, I, 23—24; A. II, 7; L.l. 45—48; L.tr. $\frac{8}{16}$.

"Length of head $3^{1}/_{2}$, to $3^{2}/_{3}$, of caudal $^{1}/_{5}$ to $^{1}/_{6}$, height of body $3^{1}/_{2}$ to $^{1}/_{4}$ of the total length. Eyes diameter $4^{1}/_{4}$ to $^{1}/_{5}$ of length of head, $1^{1}/_{4}$ diameters from end of snout, and 1 apart. Width of head equals $^{1}/_{2}$ its length, and its height $^{4}/_{5}$ of the same extent. Upper jaw overlapping the lower, and being itself overhung by the snout: the maxilla reaches to below the middle or last third of the eye. Preopercle with about six widely separated but rather strong denticulations at its angle, and its lower border crenulated in the young: opercle with two rather obtuse spines. Shoulder-flap serrated. A transverse row of four pores across the snout, the free edge of the skin with five orifices and a lateral lobe. A central pore below the mandibular symphysis, having two more on either side of it. *Teeth*— villiform in the upper jaw with an outer row of conical curved ones most developed near the median line, in the lower jaw villiform in several rows above the symphysis, whilst laterally the inner row consists of curved, enlarged teeth, and the outer villiform ones soon disappear. *Fins* — dorsal spines of moderate strength, the third to the seventh being the longest and equal to half the height of body and one-third higher than the second dorsal fin. The pectoral equals the length of the head excluding the snout. Ventral reaches half way to the vent, its outer ray prolonged. Second anal spine $^{2}/_{3}$ as long as first ray, and equals about $^{1}/_{3}$ of the height of the body, length of the base of the fin $^{1}/_{4}$ of that of the soft dorsal. Caudal wedge-shaped in the young, becoming more obtuse in the adult. *Scales* — ctenoid except on the cheeks. *Lateral line* — curves to below the middle of the soft dorsal when it proceeds straight, the tubes have usually a single branch on either side. *Air-vessel* — with 14 or 15 lateral processes on either side, each having two

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one-third higher than the rays and equal to 3/5 of the height of the body. Second anal spine nearly as long as the first ray and equals the length of the postorbital portion of the head, length of the base of the anal fin equals $4^{1}/_{4}$ in that of the soft dorsal. *Scales* — ctenoid, except on the snout and below the eyes; 48 rows along the lateral line, 50 above it, and 45 below it."

or three insertions. *Colours* — silvery-gray, abdomen whitish, cheeks tinged with golden. Five broad black bands, sometimes interrupted, extend over the back, the first from the nape passes backwards and downwards, and shortly after crossing the lateral-line abruptly terminates. The second commencing opposite from the fifth to the seventh dorsal spines passes backwards and downwards, terminating opposite the middle of the ventral fin. The third arising opposite the second and third dorsal rays or between the two dorsal fins passes downwards parallel to the second band. The fourth commences below the centre of the second dorsal and descends to the lateral line: the fifth taking the same course is below the last few dorsal rays; occasionally there is a sixth over the free portion of the tail. Upper two-thirds of first dorsal stained black, becoming more indistinct with age: caudal slightly tinged with black, the other fins yellowish.

Habitat: Seas of India, attaining at least a foot in length, it is not considered good eating. [After Day].

Note: A single specimen of 125 mm length described from Pinang by Cantor (Cat. Malay. Fish. p. 68) as *Johnius maculatus* Bloch, Schneider Var.? was refuted as to its identity by Günther (1860) and afterwards by Bleeker (1873) who, without having seen the fish, gave it the new name *Johnius cantori*, being in doubt about it belonging to *Johnius* or *Pseudosciaena* as the dentition of the lower jaw was unknown. Day (Fish. India 4° p. 190), having seen the type of Cantor in the British Museum, completed in a note (s. p. 538) Cantor's diagnosis by adding f.i. "the teeth are in enlarged outer row in the upper jaw: solely villiform ones in the lower." Notwithstanding this character of *Johnius,* Day places his *Sciaena maculata* (Bl. Schn.), with which he identifies Cantor's fish, in his Synopsis of the genus Sciaena (Fauna of British India p. 111) not in the group: "No inner row of enlarged teeth in lower jaw (Johnius)" but in the first group: "An inner row of enlarged teeth in lower jaw (Pseudosciaena)." This error seems to be a consequence of the description of the dentition of what he registers in his great 4° opus as *Sciaena maculata* (Bloch), which description is again in disharmony with his later diagnosis of *Sc. maculata* in the Fauna of British India p. 119 which both are not identical, perhaps by misprint. This series of errors is continued by Fowler, who compiled from Day's latest version his diagnosis of *Johnius maculatus* Bloch, to which he also added *Johnius cantori* Bleeker as synonym. After all, the last named species seems still to be questionable and its identity with *maculatus* doubtful.

10. **Johnius osseus** (Day)

Sciaena ossea Day, Fish. India 4° 1878—1888, p. 193. — Fauna Brit. India II, 1889, p. 123.
Bola ossea Jordan & Starks, Ann. Carnegie Mus. XI, 1917, p. 453.
Johnius cantori Fowler, Proc. Acad. Nat. Sci. Philadelphia 1931, p. 447.
Johnius osseus Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 379.

The presence of the continental Indian *J. osseus* (Day) at Singapore, at the western border of our faunistic province, is dubious as Fowler, who registered it from Singapore, says that it would seem that the specimen he originally described under the name of *Johnius cantori* Bleeker, more closely approaches *Johnius maculatus* Bloch. It is an error when Jordan & Starks say: "The inner row of mandibular teeth are enlarged (Day places the species in "Johnius" a group without enlarged teeth: his specimen was however much longer than ours)". But Day was right in his nomenclatorial arrangement as he described the teeth "villiform in both jaws with an outer enlarged row in the premaxillaries"; as is conform with his group "*Johnius*".

6. **Sciaena** Linnaeus

(Linnaeus Syst. Nat. ed. Xa, I, 1758, p. 288. Type *Sciaena cirrhosa* L.)
Umbrina Cuvier, Règne Anim. II, 1817, p. 297.

Differs from Johnius chiefly by a barbel under symphysis of mandible with a wide pore at its base; besides the obtuse, inflated snout is relatively more prominent before the inferior mouth; otherwise it equals Johnius in the dentition. (Fig. 100) Dorsal IX—XII, I, 22—31.

Distribution: Indo-Australian Archipelago, Philippines, British India, Malay-Peninsula, Cochin-China, Southern China, Arabia, Red Sea, Madagascar, South Africa. In sea and estuaries.

Key to the indo-australian species of Sciaena

1. D. 24—26; L.l. ca 52; L.tr.$\frac{6-7}{16-17}$; barbel robust, equal half eye; scales on head and body cycloid; 2. 3. 4. dorsal spines filamentous prolonged; 2. 3. subequal, highest, nearly equal height of body; anal base 4 times in soft dorsal 1. *Sc. dussumieri* p. 542.

2. D. 28; Ll. ca 50; L.tr. $\frac{6-7}{11-12}$; barbel slightly shorter than eye; scales on head cycloid, otherwise ciliate, also the smaller on nape. 3. dorsal spine highest, twice diameter of eye, anal base about twice in base of soft dorsal. 2. *Sc. russelli* p. 544.

3. D. 30—31; L.l. 44—45; L.tr. $\frac{4-5}{14-15}$; barbel short, less than diameter of pupil to obsolete; scales on cheeks, opercles and breast cycloid, otherwise ciliate; 2. and 3. dorsal spine highest, 2 to 2½ in height of body; base of anal 4½ to 5 in that of soft dorsal. . . . . 3. *Sc. macropterus* p. 546.

1. **Sciaena dussumieri** (C.V) (Fig. 100, p. 487)

Umbrina dussumieri Cuvier & Valenciennes, Hist. Nat. Poiss. IX, 1833, p. 481.

Umbrina dussumieri Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3) II, 1845, p. 523. — Verh. Batav. Gen. XXIII, (1849) 1850. Sciaenoid. p. 19.

Umbrina amblycephalus Bleeker, Nat. Tijdschr: Ned. Indië VIII, 1855, p. 412.

Umbrina dussumieri Günther, Cat. Brit. Mus. II, 1860, p. 18.

Umbrina amblycephalus Günther, loc. cit. p. 278.

Umbrina dussumieri Day, Proc. Zool. Soc. London 1865, p. 18. — Fish. Malabar 1865, p. 48.

Umbrina amblycephalus Kner, Sitzber. Acad. Wien LVIII, 1868, p. 320.

Sciaena dussumieri Bleeker, Ned. Tijdschr. Dierk. IV (1871) 1872, p. 142. — Verh. Akad. Amsterdam XIV, (1873) 1874, Sciénoides, p. 56. — Atl. ichth. IX, 1877. Tab. 387, fig. 4.

Sciaena dussumieri Günther, Ann. Mag. Nat. Hist. 1874, p. 155.

Sciaena dussumieri Karoli, Termeszetrayzi fuzetek V, 1882, p. 13.

Umbrina amblycephalus Karoli, loc. cit. p. 13.

Umbrina dussumieri Day, Fish. India 4° 1878—1888, p. 183. — Fish. Brit. India II, 1889, p. 110.

Umbrina dussumieri Pellegrin, Bull. Soc. Zool. France XIII, 1905, p. 84.

Umbrina dussumieri Jordan & Seale, Bull. Bur. Fish. XXVI (1906) 1907, p. 25.

Umbrina dussumieri Evermann & Seale, loc. cit. p. 87.

Umbrina dussumieri Jordan & Richardson, Bull. Bur. Fish. XXVII, 1908, p. 261.

Umbrina dussumieri Zugmayer, Abh. Bayer. Akad. Wissensch. XXVI 1913, p. 19.

Sciaena dussumieri Fowler, Proc. Acad. Nat. Sci. Philadelphia LXX, 1918, p. 43.

Sciaena dussumieri Fowler & Bean, Proc. U. S. Nat. Mus. LXXI, 1927, p. 8.

Umbrina dussumieri Herre, Notes Fish. Zool. Mus. Stanford University 1931, p. 57.

Sciaena dussumieri Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 412.

D. X, I, 24—26; A. II, 7; L.l. ca. 52; L.tr. $\frac{6-7}{16-17}$.

Oblong, compressed; dorsal profile more convex than the nearly straight ventral; rostro-dorsal profile convex, height less than head, 3.75—4.50 in length; head 3.4—4. Eye oval, more or less than 4 in head, situated in its anterior half; eye diameter shorter than broadly convex interorbital space, about 1.4 in snout. Two approximate nostrils, the posterior oval, close to eye, the anterior round, valvulate. Snout prominent, blunt, the free border with a median pore, on each side a lateral incision, inside of which a small lobe. Cleft of mouth almost horizontal; upper jaw reaching behind pupil, maxillary concealed, lower jaw inferior included in the upper, a robust mental barbel, equal to half diameter of eye, with a basal pore, laterally two conspicuous pores; opercle with a flat non-pungent spine, preopercle crenulate, the angle rounded; posttemporal entire. Teeth in upper jaw in a close set single series of conical and rather strong ones, decreasing in size hindwards, and in an inner rather broad villiform band; in lower jaw in a broad villiform band with an edentulous interspace at symphysis. Scales on head and body cycloid, smaller on nape and anterior part of back, sparsely on base of soft dorsal and anal, sensory tubes of lateral line terminally bifurcate. Dorsal deeply incised, base of spinous part about half length of that of soft part, the second, third and fourth spine with a filamentous prolongation, the second and third about subequal, almost as high as height of body, the fourth slightly lower, the sequent rapidly diminishing in height; the soft dorsal nearly half height of body terminally rounded; anal rounded, its base nearly four times in base of soft dorsal, the second anal spine equals eye, somewhat shorter than first ray, the first spine very small. Pectorals acute, shorter than head without snout; ventrals about twice diameter of eye. Caudal convex in young, in adult superiorly with a somewhat acute angle, least height of its peduncle equal to interorbital space. Brown or grayish above, often with a coppery hue, lighter or silvery along abdomen, fins yellowish, powdered with brown, spinous dorsal more or less darker, at least the border. Length up to 225 mm.

Nomen indig.: Tigowodjo, Krokot (Java.); Siliman (Madura).

Habitat: Singapore; Banka; Sumatra (Trussan, Padang, Benkulen); Java (Batavia, Samarang, Tjilatjap, Pasaruan); Bali; Ambon. — Natal?, Madagascar, British-India, Ceylon, Indo-China, Southern China, Formosa, Philippines.

Note: Fowler quotes in the synonymy of this species *Umbrina fuscolineata* von Bonde from Natal and *U. dussumieri* described by Gilchrist & Thompson also from Natal, which are undoubtly the same. He calls *fuscolineata* v. Bonde "closely related to dussumieri C. V. evidently synonymous". They agree indeed in the cycloid scales and in the weakness and subequal height of the second and third dorsal spines. Barnard (Ann. S. African Mus. XXI, 1925—1927, p. 577) says that the chief difference from *dussumieri* lies in the long spinous dorsal, which in *dussumieri* is much higher, being nearly quite equal to the depth of the body, in *fuscolineata* about half that height. But there are more differences: The second, third and fourth dorsal spines have a conspicuous filamentous termination, which is wanting in *fuscolineata*; also von Bonde's description of the dentition in his species differs essentially from ours. The identity of the two species seems therefore questionable.

2. **Sciaena russelli** (C.V.)

Labrus spec. Russell, Fish. Vizagapat. II, 1803, p. 13.
Umbrina Russelii Cuvier & Valenciennes, Hist. Nat. Poiss. V, 1830, p. 178.
Umbrina Kuhli = *Sciaena indica* K. & v. H. Cuvier & Valenciennes, loc. cit. p. 179.
Umbrina Kuhlii Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3) II, 1845, p. 523.
Umbrina russelii Richardson, Rep. Ichth. China, Rep. Brit. Assoc. Adv. Sci. (1845) 1846, p. 226.
Umbrina russelli Cantor, Journ. Asiat. Soc. Bengal XVIII, (1849) 1850, p. 1053.
Umbrina Kuhlii Bleeker, Verh. Batav. Gen. XXIII (1849) 1850, Sciaenoid. p. 19.
Umbrina russellii Günther, Cat. Brit. Mus. I, 1859, p. 278.
Sciaena Kuhlii Bleeker, Versl. Akad. Amsterdam (2) II, (1867) 1868, p. 292.
Umbrina russellii Kner, Novara-Exp. Fische 1865—1867, p. 131.
Sciaena russellii Bleeker, Verh. Akad. Amsterdam XIV, (1873) 1874, Sciénoides, p. 58.
Umbrina russelli Day, Fish, India 4° 1878, p. 183. — Fish. Brit. India II, 1889, p. 110.
Umbrina russelli Jordan & Seale, Bull. Bur. Fish. XXVI, (1906) 1907, p. 25.
Umbrina russelli Evermann & Seale, l.c. p. 87.
Umbrina russelli Seale, Philippine Journ. Sci. V, 1910, p. 279.
Umbrina indica Chaudhuri, Mem. Indian Mus. V, 1923, p. 725.
Umbrina russelli Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931, p. 57.
Sciaena indica Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 410.
Sciaena indica Fowler, Proc. Ac. Nat. Sci. Philadelphia LXXXVI, 1934, p. 75.

D. X, I, 28; A. II, 7—8; L.l. ca. 50; L. tr. $\frac{6-7}{11-12}$.

Oblong, compressed; rostro-dorsal profile convexly ascending, ventral profile nearly straight, height 3—3.6 in length, head about equal, obtuse; eye 3 to nearly 4 in head, situated in anterior half of head, high up, equal to convex interorbital space and almost equal snout. Two somewhat oval approximate nostrils, the posterior largest, close to eye. Snout blunt, prominent with a median and a deeper lateral incision, between them a small lobe, above them well developed muciferous channels; cleft of mouth horizontal, inferior, upper jaw the longest reaching behind pupil, maxilla totally concealed; lower jaw at symphysis with a barbel, slightly shorter than eye, with a basal pore and two on each side. Opercle with a non-pungent spine, angle of preopercle rounded, its border weakly denticulate. Teeth in upper jaw in a single series of somewhat stronger inward curved ones and an inner narrow villiform band, anteriorly and posteriorly much broader; in the lower jaw in a single series of small conical teeth. Scales cycloid on head, otherwise ctenoid, also the smaller ones on nape; lateral line arched to opposite anal, sensory tubes terminally only partially somewhat bifid. Base of spinous dorsal less than twice shorter than soft dorsal but much higher, the third spine the highest, twice diameter of eye, the highest ray about half shorter. Soft dorsal and anal rounded, base of latter almost thrice in base of soft dorsal; the spines rather robust, the second nearly equal to first ray, the first almost one third shorter. Pectorals somewhat shorter than head without snout, acutely rounded; ventrals shorter, the first ray ending filamentous. Caudal rhombic, rounded, least height of peduncle scarcely longer than eye. Grayish above, silvery below, sometimes an indication of a darker triangular patch before dorsal, spinous dorsal more or less dark brown or at least terminally blackish, paired fins hyaline. Length 170 mm.

Nomen indig: Gulama (Malay.), Lemah (Sundan.), Tigowodjo, Ganglomo (Javan.).

Habitat: Pinang; Singapore; Bintang; Banka; Sumatra (Benkulen, Padang, Palembang); Java (Batavia, Japara); Madura; Borneo (Singkawang, Pamangkat, Sandakan); Celebes (Makassar); — British India, Ceylon, Malay Peninsula, Siam, Indo-China, Southern China, Philippines.

Note: There is an evident error in the naming of this species since 1923. In that year the universally used name *Umbrina russelli* C.V. was changed in *Umbrina indica* (Kuhl & van Hasselt) by Chaudhuri, who wrote in Mem. Indian Mus. V, 1923, p. 725 as follows: "Russell described and figured this fish from .... Vizagapatam under its local name as a *Labrus* with pentagonal tail. Twenty one years later Kuhl and van Hasselt redescribed it from a specimen obtained at Java and supplied a name under approved method and called it *Sciaena indica.* Cuvier & Valenciennes, though acknowledging the name given by them rechristened the species after the senior author and called it *U. Kuhlii* and thinking it a different species, invented the name *U. russellii* for Russell's species from Vizagapatam. Later authors, finding out the identity of *U. Kuhlii* with Russell's species, dropped the name, but did not restore the earlier name...... The law of priority demands that the name given by Kuhl and van Hasselt should be restored." Chaudhuri cites for his correction Bull. Sci. Nat. (Ferussac). II, 1824, pp. 374 and 377, a quotation repeated in the above named papers of Fowler. The paper in the cited Bulletin, containing the pages 374—377, is a translation of a paper of van Hasselt in Konst- en Letterbode August 1823 N° 35 and contains no word over a *Sciaena indica.* Evidently it is merely a Museum name. Accordingly Cuvier writes in his quotation of that species "M.M. Kuhl et van Hasselt ont envoyé de Java au Musée royal des Pays-Bas une ombrine dont les proportions......" The reference of Chaudhuri seems to be imaginary. The law of priority demands therefore that of the two synonym names *russelli* and *kuhli* of Cuvier & Valenciennes the first should be restored and used as having page-precedence.

3. **Sciaena macroptera** (Blkr.)

Umbrina macropterus Bleeker, Nat. Tijdschr. Ned. Indië IV, 1853, p. 254.
Umbrina macroptera Günther, Cat. Brit. Mus. II, 1860, p. 279.
Sciaena macropterus Bleeker, Verh. Akad. Amsterdam XIV, (1873) 1874, Sciénoides, p. 60. — Atl. ichth. IX, 1877, Tab. 384, fig. 5.
Umbrina macroptera Day, Fish. India 4° (1878—1888), p. 182. — Fish. Brit. India II, 1889, p. 108.
Umbrina macroptera Perugia, Ann. Mus. Civ. Genova (2), VII, 1889, p. 273.
Sciaena macroptera Fowler, Journ. Acad. Nat. Sc. Philadelphia (2), XII, 1904, p. 530.
Umbrina macroptera Bean & Weed, Proc. U. S. Nat. Mus. XLII, 1912, p. 606.
Umbrina macroptera Jordan & Starks, Ann. Carnegie Mus. XI, 1917, p. 454.
Umbrina macroptera Barnard, Ann. S. African Mus. XXI, 1925—1927, p. 581.
Umbrina macroptera Machan, Ann. Nat. Museum Wien XLIV, 1930, p. 436.
Sciaena macroptera Fowler, Bull. U. S. Nat. Mus. XII, 1933, p. 412.

D. X, I, 30—31; A. II, 7—8; L.l. 44—45; L.tr. $\begin{array}{c}4\text{—}5\\ \hline 1\\ \hline 14\end{array}$.

Oblong, compressed; dorsal profile from snout to origin of dorsal convexly ascending, thence descending, ventral profile more or less straight. Height 3.25 to more than 3.50 in length; head 3.50 to nearly 4, obtuse. Eye 4 to nearly 5, situated in anterior half of head, less than somewhat convex interorbital space. Two oval nostrils, the posterior larger, close to lower frontborder of eye. Snout about equal eye, rather inflated, obtusely convex, prominent before nearly horizontal cleft of mouth, its free border overhanging, entire except two superficial lateral incisions and with 5 more or less conspicuous pores. Upper jaw reaching posterior half of eye, maxillary nearly totally concealed, distally rounded. The short mandible with a symphysial barbel, shorter than pupil, sometimes nearly obsolete, with a basal pore and on each side with two conspicuous pores. Preopercle with rounded angle, its hindborder slightly denticulate, opercle with two weak spines, posttemporal entire. Teeth small in villiform bands, in intermaxillaries the outer series somewhat stronger, the mandibulary ones subequal. Scales rather large, regular, on cheeks, opercles and breast cycloid, otherwise ciliate; lateral line arched, concurrent with back, about the 20 anterior sensory scales with fan-shaped tubes, the following successively less branched to bifid. Spinous dorsal nearly to base separated from soft part, its base more than twice shorter, its height more than that of soft dorsal; spines slender, the second and third being the longest, 2 to 2½ times in height of body, the rays about $^1/_3$ shorter. Soft dorsal and anal rounded, base of latter 4½ to 5 in that of soft dorsal, both fins with scaly base; second anal spine of moderate strength, shorter than longest ray. Pectorals pointed, longer than head without snout; ventrals shorter. Caudal rhomboid, least height of its peduncle somewhat more than thrice in head. Greyisch or brownish above, lighter below, sides and fins finely dotted with black or brown, most so spinous dorsal. Length up to 230 mm. [Specimen of Bleeker's collection in the Leiden Museum seen by us].

Habitat: Nias; Pulu Weh!; Sumatra (Benkulen, Priaman, Padang, Belawan Deli!); Java (Palabuan Ratu!). — British India, Ceylon, Coast of Natal. —

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30. Fam. MALACANTHIDAE

(Branchiostegidae, Latilidae)

Elongate, subfusiform; head more or less conical, with the dorsal profile usually convex; suborbital without a bony stay;

eyes lateral; two nostrils before and close to eye. Mouth terminal, protactile, with thick fleshy lips, the gape moderate wide, horizontal or nearly so, jaws equal; maxillary distally exposed, no supramaxillary. Anterior teeth in villiform bands, lateral in a single row, some of them enlarged or caniniform, often an isolated curved canine near end of intermaxillary, none on vomer and palatines. Scales small, ctenoid; lateral line continuous, complete. Branchial opening wide, four gills with a slit behind the fourth; gillmembranes united, free from isthmus or attached to it, pseudobranchiae present, five to six branchiostegals, gillrakers little developed. Preoperculum entire or serrate, operculum with a strong flat spine. Dorsal continuous, long, with IV—IX weak spines; anal similar with I—II small spines. Pectorals more or less pointed, all rays branched. Ventrals originating below their base with an osseous spine and five rays, no scaly axillary process; a subocular shelf present, 24—30 vertebrae, caudal with 15 branched rays.

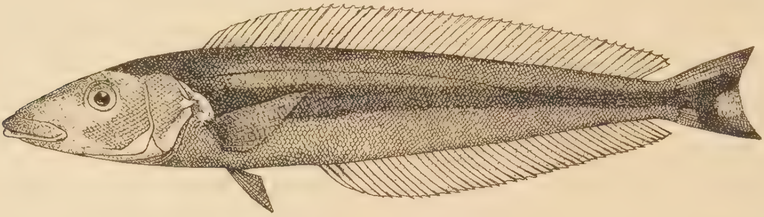

Fig. 105. *Malacanthus latovittatus* (Lac.) × 1/3

Distribution: Tropical marine carnivorous fishes of medium or large size.

1. **Malacanthus** Cuvier

(Cuvier, Règne animal 2me édit. II, 1829, p. 264.)
Oceanops Jordan & Seale, Bull. Bur. Fish. XXV (1905) 1906, p. 277.

Elongate; the conical or convex head and short subcylindrical trunk slightly, the long tail strongly compressed, tapering to caudal. The small, finely ciliated scales wanting on top of head before nape and on snout, present on opercular apparatus; lateral line, complete, from top of gillopening to behind middle of dorsal slightly arched, from there descending to middle of height of tail and running to caudal continued on that fin. Two nostrils before eye, the posterior a longitudinal slit, the anterior small, circular and tubular. Eyes lateral, more or less in middle of head. Mouth wide, terminal, its gape horizontal or somewhat oblique with thick fleshy lips; jaws equal, intermaxillary protractile, maxillary not concealed, no supplemental bone. Teeth sharp, in upper jaw anteriorly in a rather broad cardiform band, the outer series enlarged, hindward continued in a single row terminating with an isolated forward curved canine, the anterior mandibulary teeth in a villiform band the outer enlarged, laterally continued in a single row of some caniniform teeth, followed by minute ones. Hindborder of operculum with a strong spine, preoperculum entire, gillopening wide, four gills with a slit behind the fourth, gillmembranes united, connected with isthmus, pseudobranchiae present, five to six branchiostegals. Dorsal and anal very long, the single dorsal beginning about above origin of pectorals with IV—VI rather weak flexible spines of the character of not articulated rays and about 40—55 rays, terminating somewhat before caudal; anal similar with I spine and 40—50 rays terminating about below dorsal. Caudal more or less truncate. Pectorals pointed; ventrals originating below base of pectorals with a pungent spine and five branched rays; no axillary process. Suborbital without bony stay.

Key to the indo-australian species of Malacanthus

1. Head rather short 4.5—5 in length, preocular profile convex, D. V, 57; A. I, 50—51; L.r. 166—173 . . . . 1. *M. hoedti* p. 549.
2. Head long, with produced conical snout, D. IV, 43—46; A. I, 38—40, L.r. 120—130. . . . . . 2. *M. latovittatus* p. 551.

1. **Malacanthus hoedti** Blkr.

Malacanthus hoedtii Bleeker, Acta Soc. Sc. Indo-Neerl. VI, 1859, p. 18.
Malacanthus hoedti Günther, Cat. Brit. Mus. III, 1861, p. 361.
Malacanthus hoedti Bleeker, Enum. Poiss. Madagascar 1875, p. 80.
Malacanthus parvipinnis Vaillant & Sauvage, Rev. Mag. Zoologie (3) III, 1875, p, 283.
Malacanthus hoedtii Günther, Fische Südsee 1876, p. 160.
Malacanthus hoedti Bleeker, Arch. Néerl. Sc. Nat. XIII, 1878, p. 53. — Verh. Akad. Amsterdam XVIII. (1877) 1878, Poiss. Maurice p. 17.
Malacanthus Hoedtii Sauvage, Poiss. Madagascar 1891, p. 336.
Malacanthus hoedtii Ogilby, Proc. Linn. Soc. N. S. Wales 1899, p. 741.
Malacanthus hoedtii Steindachner, Denkschr. Akad. Wien LXV, 1900, p. 497.
Malacanthus hoedti Steindachner, Abh. Senckenberg. Nat. Ges. XXV, 1901, p. 433.
Malacanthus hoedtii Waite, Rec. Austral. Mus. V, 1904, p. 201.
Malacanthus parvipinnis Jenkins, Bull. U. S. Fish. Comm. XXII (1902) 1904, p. 499.

Malacanthus parvipinnis Snyder, loc. cit. p. 536.
Malacanthus parvipinnis Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII, (1903), 1905, p. 275.
Malacanthus parvipinnis Jordan & Seale, loc. cit. XXV, (1905) 1906, p. 277.
Malacanthus parvipinnis Snyder, Proc. U. S. Nat. Mus. XLII, 1912, p. 505.
Malacanthus hoedtii Herre, Philipp. Journ. Sc. XXXXI, 1926, p. 221.
Malacanthus hoedti Fowler, Fish Oceania, Bishop Mus. X, 1928, p. 236.

D. V, 57; A. I, 50—51; L.l. 166—173.

Elongate, dorsally and ventrally evenly tapering to caudal, head and short trunk not much, the long tail strongly compressed; height 6.4—7.5 in length, head 4.55 with preocular convex dorsal profile, snout bluntly pointed, nearly thrice in head, much longer than eye which goes more than 4 times in head and is situated high up in middle of head; the flattened interorbital space much broader than diameter of eye 3.3 to less in length of head. Posterior nostril a horizontal slit in a narrow groove close to eye, the anterior circular, tubulate. Mouth somewhat oblique, with thick fleshy lips, the jaws equal, the upper reaching below front part of eye. Intermaxillary teeth anteriorly in a villiform band, the outer series enlarged, posteriorly continued in a single row with about six curved canines, terminating with an isolated forward curved canine; in the lower jaw a symphysial villiform band of minute teeth, the outer series somewhat larger, continued in a single row increasing in size posteriorly, the middle ones caniniform. Operculum with a strong spine. Six branchiostegals, the most median very short. Scales rounded, before dorsal, on nape and on head elongate, below anterior part of dorsal square. Dorsal and anal rays highest in their middle, in both fins of about equal height; caudal truncate. Pectorals pointed, about 6.5 in length; ventrals narrow, pointed, close together, about 2.6 in length of head. Gray to brown above with about twenty somewhat curved or angulate descending transverse diffuse bands not reaching ventral profile, ground colour of sides and below pearl coloured, caudal with a superior and inferior converging black band on yellow ground, dorsal and anal yellowish brown, pectorals and ventrals lighter. Lenght up to 275 mm.

Habitat: Pulu Weh!; Sumatra (Padang); Ternate; New Guinea (Doreh!). — Madagascar, Mauritius, Okinawa, Philippines, Louisiade Arch., Caroline Isls., Hawaii, Lord Howe Isl., New Zealand.

2. **Malacanthus latovittatus** (Lac.). (Fig. 105, p. 548)

Labrus latovittatus Lacépède, Hist. Nat. Poiss. III, 1802, pp. 455, 527.
Taenianotus latovittatus Lacépède, loc. cit. IV, 1803, p. 304.
Labrus latovittatus Quoy & Gaimaird, Voy. Astrolabe, Zool. III, 1834, p. 701.
Malacanthus taeniatus Cuvier & Valenciennes, Hist. Nat. Poiss. XIII, 1839, p. 239.
Malacanthus taeniatus Bleeker, Verh. Batav. Gen. XXII (1847) 1849, p. 7. — Monit. Indes Orient. I, 1849, p. 42. — Nat. Tijdschr. Ned. Indië II, 1851, p. 218. — Acta Soc. Indo-Néerl. VIII, 1860, p. 43.
Malacanthus latovittatus Günther, Cat. Brit. Mus. III (1860) 1861, p. 360.
Malacanthus latovittatus Bleeker, Ned. Tijdschr. Dierk. I, 1863, p. 236.
Malacanthus latovittatus Günther, Fische Südsee 1876, p. 160.
Malacanthus latovittatus Bleeker, Arch. Néerl. Sc. Nat. XIII, 1878, p. 53. — Verh. Akad. Amsterdam XVIII, (1877) 1878, Poiss. Maurice, p. 17.
Malacanthus latovittatus Macleay, Proc. Linn. N. S. Wales VII, 1882, p. 360. — loc. cit. VIII, 1883, p. 266.
Malacanthus latovittatus Day, Fish. India 4° Suppl. 1888, p. 787. — Fish. Brit. India II, 1889, p. 86.
Malacanthus latovittatus Sauvage, Poiss. Madagascar 1891, p. 518.
Malacanthus urichthys Fowler, Journ. Acad. Nat. Sci. Philadelphia (2) XII, 1904, p. 549.
Oceanops latovittata Jordan & Seale, Bull. Bur. Fish. XXV, (1905) 1906, p. 277.
Oceanops latovittatus Snyder, Proc. U. S. Nat. Mus. XLII, 1912, p. 505.
Malacanthus latovittatus Herre, Philippine Journ. Sci. XXXI, 1926, p. 220.
Malacanthus latovittatus Fowler, Fish. Oceania, Bishop Mus. X, 1928, p. 236.

D. IV, 43—46; A, I, ca. 38—40; L.l. 120—130.

Elongate, compressed; dorsal and ventral profile evenly tapering to caudal, height of short trunk 6.33 or less in length; head 3.56 or somewhat less in length, conical; snout pointed twice in head and more than twice longer than eye, which goes about 5.5 in head, is situated in its middle, high up and more than 1½ times shorter than flat interorbital space measuring 3.3 in length of head. Mouth with broad, thick, fleshy lips and nearly horizontal gape, jaws equal, termination of upper jaw far distant from eye, its length thrice in head. Scales rounded, elongate on opercles and nape, square on superior part of trunk. Operculum with a strong flat spine; five to six branchiostegals. Teeth in jaws anteriorly pluriseriate, the outer series enlarged and more or less curved, continued in a single posterior series of conical ones, the middle ones highest, in the upper jaw terminating with a single isolated curved canine; vomer and palatines toothless. Dorsal beginning above origin of pectorals terminating near caudal, the rays about thrice lower than height of trunk, spinous part still lower; anal with the anterior rays highest, terminating below end of dorsal; caudal somewhat emarginate, with more or less pointed upper and lower tip; pectorals longer than half head, pointed, the rays of the upper third the longest, ventrals about twice length of eye, acute, the short spine osseous. Colour of back and head in alcohol blackish, in life blue with a broad blackish band from head to end of caudal with a branch to lower part of caudal; lower part of head and body grayish white; dorsal brownish with lighter margin, anal yellowish pectorals basally brown, outer half gray, ventrals white. Length up to 330 mm.

Habitat: Simalur!; Sumatra (Padang); Celebes (Bulucomba); Flores; Ambon; Ternate; Batjan; New Guinea!. — Bourbon, Mauritius, Ceylon, Okinawa, Philippines, Micronesia, Polynesia.

31. Fam. CEPOLIDAE

Very elongate, slender, gradually tapering to caudal, strongly compressed. Trunk very short, vent below pectorals. Head obtuse, compressed, very short, well ossified, with a short not prominent crest, subocular shelf wanting. Scales minute 1), wanting on preocular part of head; on jaws and fins, cycloid, rounded, or quadratic; lateral line ascending from upper corner of branchial opening to dorsal and running along its base, or obscure. Eye lateral in anterior half of head, entering dorsal profile. Two nostrils on each side of head, the posterior close to eye, the anterior much smaller. Mouth terminal, strongly oblique; wide maxillary exposed, without a supplemental bone, snout very short. Teeth slender, rather long, sometimes recurved and canine-like, wide-set in a single row, the posterior shorter; none on vomer and palatines. Gill opening wide, gill-membranes separate, free from isthmus, four gills, pseudobranchiae present, six branchiostegals. Opercle and preopercle deep, the latter entire or with an angular spine and some minute ones before it. Dorsal and anal very long, the first originating on nape, the anal somewhat behind origin of pectorals, both continuous with caudal or terminating very approximate to it, composed of rather high, flexible rays of nearly uniform length,

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1) Steindachner & Döderlein, Denkschr. Akad. Wien LIII, p. 269, by confusing 2 species of *Cepola* with different number of scales in longitudinal line, came erroneously to the conclusion, that the number of scales increases with growth. See Koumans, A case of increase of the number of scales during growth in Fishes. Temminckia I, 1936, p. 274.

about the three anterior not articulated or branched but not spinous. Pectorals short, branched; ventrals slightly before their origin, with a spine and five soft rays [1]), without a scaly axillary process. Caudal reduced with 9 to 10 rays, the middle ones more or less prolonged; an increased number of vertebrae.

Distribution: Costal marine carnivorous fishes of medium to large size inhabiting temperate water of atlantic and mediterranian Europe, straggling to British Isles; temperate and tropical coasts of British India, Malay Peninsula, China, Japan, Formosa, Philippines, Indo-Australian Archipelago, Australia and New Zealand.

1. **Acanthocepola** Bleeker

(Bleeker, Versl. Akad. Amsterdam (2), VIII, 1874, p. 369.)

Opercular bones scaly; preoperculum with an angular spine and four or more small spines at its lower border. Scales on trunk regularly imbricate. Dorsal rays indistinctly articulate and only posteriorly somewhat branched.

Distribution: British India, costal waters of Southern Japan, Formosa, Philippines, Indo-australian Archipelago.

1. **Acanthocepola abbreviata** (C.V.). (Fig. 106)

Cepola abbreviata Cuvier & Valenciennes, Hist. Nat. Poiss. X, 1835, p. 403. (after drawing of Kuhl & v. Hasselt and Mertens).
Cepola abbreviata Cantor, Cat. Malayan Fish. 1850, p. 1160.
Cepola abbreviata Bleeker, Acta Soc. Sc. Indo-néerl. III, 1858, Vischfauna Sumatra p. 38 (after drawing of v. Hasselt).
Cepola abbreviata Günther, Cat. Brit. Mus. III, 1859—1861, p. 488.
Acanthocepola abbreviata Bleeker, Verh. Akad. Amsterdam XVIII (1877) 1878, Poiss. Chine, p. 9.
Cepola abbreviata Sauvage, Bull. Soc. Philom. (7), 1881, p. 106.
Cepola abbreviata Day, Fish. India 4° 1878—1888, p. 324. — Fauna Brit. India, Fish. II, 1889, p. 330.
Cepola abbreviata Rutter, Proc. Acad. Nat. Sci. Philadelphia 1897, p. 87.
Cepola abbreviata Duncker, Mitth. Naturh. Mus. Hamburg, XXI, 1904, p. 162.
Acanthocepola abbreviata Jordan & Seale, Bull. Bur. Fish. XXVI, (1906) 1907, p. 27.
Acanthocepola abbreviata M. Weber, Siboga-Exp. Fische 1913, p. 266.
Acanthocepola abbreviata Herre, Philippine Journ. Sci. XXXIV, 1927, p. 282.
Acanthocepola abbreviata Herre, Notes Fish. Zool. Mus. Stanford Univ. 1931. p. 58.
Cepola abbreviata Borodin, Bull. Vanderbilt Mus. I, 1932, p. 85.

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1) Hilgendorf, Sitzb. Ges. naturf. Freunde Berlin 1890, p. 14.

D. ± 70; A. ± 70; L.r. about 200.

Ribbon-like compressed, elongate, tapering towards pointed tail; height shortly behind head about 7.6 (in specimens of about 170 mm length) and nearly equal to rounded compressed head. Eye in anterior half of head, 2.7 in its length, entering dorsal profile, its diameter nearly twice flat interorbital space, which goes about thrice in length of head. Snout short, blunt, 1.5 in eye and 4.2 in head, with a median hump by the prominent intermaxillary pedicels. Mouth oblique, chin prominent, the jaws equal, the upper with about 27 distant teeth on each branch, the lower with fewer but somewhat larger and partly recurved teeth; maxillary totally exposed, its broad distal border reaching below hindborder of pupil. Scales imbricate in longitudinal rather regular lines, covering also opercle and preopercle, the latter with a prominent triangular spine at its rounded angle and before it three or four much smaller ones on its lower border. Lateral line ascending with keeled scales from the upper corner of the branchial opening to the third or fourth dorsal ray and running along base of that fin to caudal. Dorsal originating above middle of opercle, united with caudal as also with anal. Pectorals rounded, about 1.3 in length of head; ventrals shorter, their first ray reaching with a filament on anal. Caudal ending in a long filamentous tip. Colour of fresh specimens after Herre beautiful reddish, merging into brilliant red on dorsal, anal and caudal, paler on head, belly whitish; a series of yellow or orange crossbands on body, becoming broken into elongate spots anteriorly, head and lateral line with a brilliant silver lustre over all; anal and caudal with a black marginal line. Our alcoholic specimens are yellowish with a silvery lustre but have lost the markings, the posterior third of the dorsal, anal and the caudal show a blackish margin. Length 200 mm and probably more.

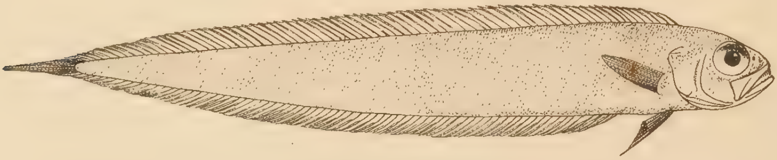

Fig. 106. *Acanthocepola abbreviata* (C.V.)

Distribution: Singapore; Pinang; Sumatra; Java; Saleyer!. — British India, Southern China, Philippines.

Key to the indo-australian families of Perciformes 1)

I. Dorsal spines present, rigid and strong or weak and flexible.

A. Two separated dorsal fins, an anterior spinous one and a posterior consisting of soft rays, sometimes with a spine in front.

a. Two spines detatched from rest of anal fin, by exception hidden in the skin . . . . *Carangi* VI. p. 188.
13. *Carangidae* VI. p. 189.
15. *Pomatomidae* VI. p. 304.

b. No spines or undivided rays detatched from rest of anal fin.

a^1. Two long barbels behind symphysis of lower jaw. Second dorsal short . . . . 19. *Mullidae* VI. p 361.

b^1. No barbels, or, if small barbels are present, the second dorsal is long.

a^2. D^1. VI—IX. D^2. 20—37. Anal long, with II—III spines. Teeth on palate . . . . . *Carangi* VI. p. 188.
14. *Rachycentridae* VI. p. 301.
16. *Lactariidae* VI. p. 306.

b^2. D^1. VI—IX. D^2. I. 8—10. Anal short, with II—III spines. Teeth on palate . . 2. *Apogonidae* V. p. 275.

c^2. D^1. IX—XII. D^2. I. 16—26. Anal long, with II spines. Teeth on vomer . . . . 9. *Sillaginidae* VI.p. 168.

B. One continuous dorsal, which may be notched between the spinous and soft part, but the fins remain connected at base.

a. Two spines detatched from rest of anal fin . . . . *Carangi* VI. p. 188.
13. *Carangidae* VI. p. 189.

b. No spines detatched from rest of anal fin.

a^1. I—II anal spines. No teeth on palate.

a^2. Dorsal more or les deeply notched 2).

a^3. Soft dorsal long . . . 29. *Sciaenidae* VII. p. 481.

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1) This key is an artificial one and does not express the affinities of the families. It is only based on the genera, occuring in the Indo-australian Archipelago. For a diagnosis of the Division *Perciformes* see Vol. VI. p. 411.

2) In *Pama perarmata,* Fam. *Sciaenidae,* the dorsal is not notched. See Fig. 101. VII, p. 496.

b^3. Soft dorsal short, with 12—15 rays . . . . . 7. *Serranidae* VI. p. 1.

b^2. Dorsal without notch . . 30. *Malacanthidae* VII. p. 547.

b^1. III—VII anal spines, exceptionally no anal spines at all.

a^2. A scaly process in the axil of the ventrals, or ventrals minute or vestigial.

a^3. Teeth on palate well developed.

a^4. Dorsal deeply notched, the anterior part with VII—IX spines, posterior part with I spine and 9—15 rays. Anal III. 6—17 . . 6. *Centropomidae* V. p. 392.

b^4. Dorsal not notched.

a^5. A. III. 7—16. Origin of dorsal before middle of body.

a^6. Ll. continuous. Jaws with an outer row of strong incisors. D. X—XI. 12—15 . 24. *Kyphosidae* VII. p. 221.

b^6. Ll. continuous. Teeth in jaws pointed, generally in several rows, often with an outer row of enlarged ones, with or without canines . 25. *Lutjanidae* VII. p. 232.

c^6. L.l interrupted. Teeth in villiform bands in jaws and palatines, conical or obtusely rounded on tongue and parasphenoid. D. XIII-XVI. 11—17 . . . 28. *Nandidae* VII. p. 475.

b^5. A. III. 15—17. Origin of dorsal behind middle of body . . . . . 21. *Toxotidae* VII. p. 194.

c^5. A. III. 26—65.

a^6. Ventrals minute or vestigial. Body very compressed, elevated. D. V—VIII. 28—30. . . 22. *Monodactylidae* VII. p.206.

b^6. Ventrals well developed. Body not very high. D. IV—VI. 9—18. . 23. *Pempheridae* VII. p. 210.

b^3. No teeth on palate, or a few small ones on vomer only.

a^4. Body elongate. Dorsal notched, XIV. I. 9. A. III. 10 . . 10. *Emmelichthyidae* VI. p. 178.

b^4. Body deep, very compressed. Dorsal many-rayed, seldom notched. Anal with III—VII spines.

a^5. Teeth generally minute, uniserial. Dorsal with a conspicuous basal sheath. Body generally silvery . 18. *Leiognathidae* VI. p. 310.

b^5. Teeth in brushlike bands in the jaws, often tricuspid, incised or setiform, seldom rudimentary. Scales more or less extending on median fins. Body seldom silvery, often with bands, spots or ocelli . . . . . . 20. *Chaetodontidae* VII. p. 1.

c^4. Body oblong or elongate. Dorsal not deeply notched 1), IX—XV. 9—20.

a^5. Jaws with flat tricuspid curved incisors . . . . . 24. *Kyphosidae* VII. p. 221.

b^5. No tricuspid curved incisors in the jaws.

a^6. Teeth generally pointed, in bands. Canines present or absent. If the teeth are molarlike, either the preoperculum is naked or D. X. 10 (11). A. III. 9 (10) . . . . 25. *Lutjanidae* VII. p. 232.

b^6. Teeth in villiform bands, the outer row

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1) Excepting *Mirolabrichthys* VII p. 321.

enlarged. D. XII. 13—17. A. III. 8—11 26. *Lobotidae* VII. p. 457.

c^6. Several rows of conical teeth in the jaws, with an outer row anteriorly of canines or incisors. Lateral teeth molars. Preoperculum scaly. D. XI—XII. 10—15. A. III. 7—13 . . . . 27. *Sparidae* VII. p. 465.

b^2. No scaly process in the axil of the ventrals. Generally teeth on palate.

- a^3. Lateral line divided in an upper and a lower portion, or incomplete.
  - a^4. D. XIII—XIV. 11—13 . 28. *Nandidae* VII. p. 475.
  - b^4. D. XI—XII. 6—9 . . . 3. *Plesiopidae* V. p. 372.
  - c^4. D. II—VII . . . . . . 7. *Serranidae* VI. p. 1.
- b^3. Lateral line complete.
  - a^4. Teeth in jaws in brush-like bands, setiform, projecting from greatly produced tubular snout, or tricuspid, either with a strong spine at angle of preoperculum or body greatly compressed and dorsal, anal and ventrals much produced . . . . 20. *Chaetodontidae* VII. p. 1.
  - b^4. Snout not tubular; if the teeth are tricuspid there is no strong spine at angle of preoperculum and the body is not greatly compressed and the fins not much produced.
    - a^5. Dorsal with XII—XIV spines.
      - a^6. Scales large. Ll. 40—42. Teeth minute, present on vomer and palatines . . . . . 7. *Serranidae* VI. p. 1.
      - b^6. Scales moderate or small. Ll. 47—95, in one case 38—42, but then the palate is toothless. Teeth in villiform bands in

jaws, the outer series enlarged, or conical or flattened and arranged in separate fixed rows, or more or less trilobate and pluriseriate . . . 8. *Theraponidae* VI. p. 139.
b^5. Dorsal with VI—XI spines.
a^6. Inner series of teeth in jaws enlarged, depressible . . . . . . 7. *Serranidae* VI. p. 1.
b^6. No depressible teeth.
a^7. Maxillary scaly. Mouth large, oblique.
a^8. Eye very large. 1.9-2.7 in head. Pectorals much shorter than head . . . . 5. *Priacanthidae* V. p. 382.
b^8. Eye moderate, 2.7—4 in head. Pectorals as long as head or nearly so . 7. *Serranidae* VI. p. 1.
b^7. Maxillary naked.
a^8. VI—VIII dorsal spines . . . . . . 7. *Serranidae* VI p. 1.
b^8. X dorsal spines.
a^9. A. III. 6—8 . 7. *Serranidae* VI. p. 1.
b^9. A. III. 10—12. 1. *Kuhliidae* V. p. 268.
c^8. XI dorsal spines. A. III. 13—14. . 20. *Chaetodontidae* VII. p. 1.
II. No dorsal spines.
A. Dorsal and anal not connected with caudal. Teeth on palate.
a. D. 9. 9—10. A. 1. 15. Scales rather large. Ll. ending below last rays of dorsal . . . . 4. *Pseudoplesiopidae* V. p. 379.
b. D. 9. A. I. 26—27. Scales large, deciduous. Deep-sea fishes . . . . 11. *Bathyclupeidae* VI. p. 181.
c. D. 57—64. A. 25—30. Elongate, compressed, scales small . . . . . 12. *Coryphaenidae* VI. p. 183.
d. D. 3—4. 40—42. A. 30—32. Strongly compressed. Body very deep, nearly triangular. Scales minute . . . 17. *Menidae* VI. p. 308.
B. Dorsal and anal long, connected with reduced caudal or nearly so. No teeth on palate. Very elongate, slender. Vent below pectorals . . . . 31. *Cepolidae* VII. p. 552.

ADDENDA

The pages 210—221 on which the *Pempheridae* are described had already left the press before we received by the kindness of Dr. J. D. F. Hardenberg his latest paper (Treubia XV, November 1935, p. 131) in which he described from Pelabuan Ratu, on the South coast of Java, two species of *Pempheris* before only known, the first from Japan, the second from Formosa and therefore not mentioned by us. As their status was rather doubtful (see Fowler, Bull. U. S. Nat. Mus. XI, 1931, p. 62) we copy here Hardenberg's more complete diagnosis:

1. *Pempheris sasakii* (Jordan & Hubbs).

Liopempheris sasaki Jordan & Hubbs, Mem. Carnegie Mus. X, 1925, p. 228.

Pempheris sasaki Fowler, Bull. U. S. Nat. Mus. XI, 1931. p. 62.

D. V, 9; A. III, 41; P. II, 17; V. I, 5; L.l. 70+11.

Height 2.5, head 3.5 in length. Eye large, 2.5 in head. Snout blunt, rounded, about 3 in eye, 6 in head. Maxillary dilated behind, reaching to below pupil. Teeth small, conical, curved somewhat backwards, in several rows on jaws especially anteriorly. Inconspicuous teeth on vomer and palatines. Height of caudal peduncle 12.4 in length of head and body. Dorsal, somewhat behind ventrals, twice in head. Longest ray a little longer than eye and postorbital part of head. Pectorals inserted before ventrals, below lower border of eye, its length about as long as head without snout. Ventrals somewhat longer than eye, surpassing anus, not reaching anal. Foremost rays of anal longest, about as long as ventrals. Its length about twice in length of snout and eye. Scales rather weak, cycloid. Seven rows on cheeks. Colour brownish with a yellowish hue when alive. Tip of dorsal blackish. Border of anal and of caudal blackish too. Paired fins hyaline. Lateral line whitish.

One specimen with a total length of 18 cm. from Pelabuan Ratu, south coast of Java, August 1933.

2. *Pempheris nyctereutes* Jordan & Evermann.

Pempheris nyctereutes Jordan & Evermann, Proc. U. S. Nat. Mus. XXV, 1903, p. 340.

Pempheris nyctereutes Jordan & Richardson, Mem. Carnegie Mus. IV, 1909, p. 181.

Pempheris nyctereutes Fowler, Bull. U. S. Nat. Mus. XI, 1931, p. 62.

D. V, 10; A. III, 41; P. II, 17; V. I. 5; L.l. 79+15.

Height 2.5 in head, 3.3 in length. Eye large, 2.4 in head, Snout blunt, not rounded, 2.1 in eye, 5.1 in head. Lower jaw somewhat prominent. Maxillary dilated behind, reaching to behind middle of pupil. Teeth small in several rows on jaws, especially anteriorly. Conspicuous patches of teeth on vomer and palatines. Height of caudal peduncle 11.5 in length of head and body. Dorsal inserted somewhat behind ventrals, its height about 2 in head, its longest rays somewhat shorter than head without snout. Pectorals inserted before ventrals, below border of eye, its longest rays about as long as head without snout. Ventrals somewhat longer than eye, surpassing anus not reaching anal. Foremost rays of anal longest, about as long as ventrals. Length of anal twice in length of head and body. Scales rather weak, cycloid, rather deciduous. Colour dull brown, especially on breast. Inner side of operculum blackish, shining through. Dorsal blackish all over. Caudal blackish with a yellowish hue. Anal with a blackish base and a hyaline border. Paired fins hyaline. Lateral line whitish, bordered by black.

One specimen with a total length of 12.5 cm from Pelabuan Ratu, southcoast of Java. August 1933.

On p. 219 we have omitted to mention that Fowler has decribed the following species:

Pempheris itoi Fowler, U. S. Nat. Mus. XI, 1931, p. 62.

"Depth $2^{1}/_{10}$ to $2^{1}/_{5}$; head $3^{1}/_{10}$ to $3^{3}/_{5}$, width 1¾ to 1⅞. Snout $4^{3}/_{5}$ to 5 in head from snout tip; eye $2^{1}/_{5}$ to $2^{3}/_{5}$, greater than snout or interorbital; maxillary reaches $^{3}/_{5}$ in eye, expansion 2⅛ to $2^{3}/_{5}$ in eye, length $1^{4}/_{5}$ to 1⅞ in head from snout tip; teeth fine, villiform, in bands in jaws, on vomer and palatines, none on tongue, interorbital 3⅛ to $3^{2}/_{3}$ convex. Gill rakers 8 + 18, lanceolate, slender, 1¾ in eye; gill filaments $^{3}/_{5}$ of gill rakers.

Scales 62 to 67 in lateral line to caudal base and 20 more on latter; 8 scales above lateral line, 16 to 18 below, 47 to 52 predorsal forward to snout tip. Scales cycloid along medial axil region of body and flanks, otherwise weakly ctenoid. Scales with 11 to 14 basal radiating striae; apical denticles 38 to 40, in 4 transverse series; circuli very fine.

D. IV to VI, 9, 1, first ray $1^{1}/_{3}$ to 1¼ in total head length; A. III, 40,1 to 42,1, first ray 2⅛ to $2^{1}/_{3}$; caudal 1 to 1⅛, deeply emarginate behind; least depth of caudal peduncle 2¾ to $2^{4}/_{5}$; pectoral $1^{1}/_{10}$ to $1^{1}/_{5}$; ventral 2 to $2^{1}/_{10}$.

Body brown, with coppery and reddish brown tints. Iris white, with brown blotch. Dorsal dusky brown on front half, pale to whitish posteriorly. Anal brownish basally, whitish terminally. Caudal yellowish white, hind edge slightly dusky, little more so above. Paired fins yellowish white.

Diagnosis, — Known by its reduced gill rakers, increased scales and largely uniform coloration.

Type. — Cat. No. 89994, U.S.N.M.

Tanakeke Island, Flores Sea, Dutch East Indies. *Albatros* Collection (18103 (2176)). December 21, 1909. Length 139 mm. General color when fresh reddish brown with metallic reflections. Lateral line whitish. Fins similar to body with red tints rather more pronounced, especially below; anal margin hyaline caudal tip slightly dusky.

17922, 17923. Tanakeke Island. December 21, 1909. Length 132 to 134 mm 2 examples.

(For K. Ito, in appreciation of his many color sketches of Philippine-East Indian fishes)."

P. 513. *Sciaena incerta* Vinciguerra, Ann. Mus. Civ. Storia nat. Genova (3) X (L) 1926, p. 578, is probably a synonym of *Pseudosciaena sina* (C.V.). After the description of the dentition the species is a *Pseudosciaena.*

While concluding the impression of this volume we received a copy of "Treubia XV, April 1936" containing a paper of Dr. Hardenberg in which he decribes on p. 251 a new species: *Iohnius weberi* Hardenberg.

CORRIGENDA

p. 6. Third line of the synonymy of **Scatophagus argus** (Bl.) read *Chaetodon argus* L. instead of *Chaaetodon argus* L.

p. 9. Third line of synonymy of **Scatophagus argus** var. **tetracanthus** read *Scatophagus fasciatus* instead of *Catophagus fasciatus.*

p. 26. Last line of synonymy read *Hemitaurichthys* instead of *Hemitaurichtthys.*

p. 54. In last line on bottom alter D. XIII—XIV in D. XI—XIV (XV), 18—24.

p. 59. In 13th line from bottom read 1. **Chaetodon.** instead of 4. **Chaetodon.**

p. 64. In 20th line of synonymy of **Chaetodon** (**Rhabdophorus**) **speculum** read *Chaetodon* instead of *Cheatodon.*

p. 66. In third line from bottom read Klunzinger instead of Kluzinger.

ibid. In 9th line from top read 5. **Chaetodon**, instead of 3.

p. 77. In 23th line from top read 1923 instead of 1913.

p. 79. Third line of synonymy of **Chaetodon** (**Tetragonoptrus**) **güntheri** Ahl read 1923 instead of 1913.

p. 80. 5. **Chaetodon** (**Tetragonoptrus**) **miliaris** Q & B must be **Chaetodon** (**Tetragonoptrus**) **miliaris** Q & G.

p. 84. In 11th line from top read *Sarothrodus* instead of *Sarathrodus.*

p. 97. In 6th line from bottom read (**Lepidochaetodon**) instead of (**Lepidochaeton**).

p. 98. In 15th line from top read the same.

ibid. In 15th line from bottom read 1928 instead of 1929.

p. 100. In 9th line from top read (*Lepidochaetodon*) instead of (*Lepidochaeton*).

p. 101. In 5th line from bottom the same.

p. 104. In 13th line from top read *Tetragonopterus* instead of *Tetraganopterus.*

p. 108. In 14th line from top read Univ. instead of Mus.

p. 120. In 18th line from top read angle instead of angel.

p. 121. In 17th line of the key read *Pomacanthus* instead of *Pomocanthus.*

ibid. In 6th line from bottom read *Holacanthus* instead of *Holancanthus.*

p. 124. In 15th line from top read Bull. U. S. Nat. Mus. VIII, 1929.

p. 134. In third line from bottom read (*nicobariensis*) instead of (*nicrobariensis*).

p. 138. Third line from top read *Holacanthus* instead of *Holocanthus.*

p. 143. Fig. 36, read *semicirculatus* instead of *semicireulatus.*

p. 144. Fig. 37 read *Pomacanthus* instead of *Pamocanthus.*

p. 146. In 4th line from bottom read *navarchus* instead of *narvarchus.*

p. 151. In 10th line from bottom read *lamarckii* instead of *larmarckii.*

p. 153. In 10th line from top read *caudovittatus* instead of *caudavittatus.*

ibid. In second line of the note read *amboinensis* instead of *amboinensii.*

p. 160. In 14th line of the key read 2. *bicolor* instead of 2. *biocolor.*

p. 163. Third line from bottom read 1929 instead of 1829.

p. 179. Second line beneath 1. **Drepane** read *Drepanichthys* instead of *Depranichthys.*

ibid. Third line from bottom of the note read substitute instead of subatitute.

p. 183. First line beneath 1. **Platax** (Cuvier, Règne Animal II, 1817, p. 334) instead of Cuvier, Règne Annival.

p. 189. In the line 2. **Platax orbicularis** change 50 in 51.

p. 190. In first line from top read *vespertilio* instead of *vespertilo.*

p. 203. In 10th line from bottom read **chatareus** instead of **chatereus.**

p. 204. In 11th line from top read 1928 instead of 1829.

p. 209. In 4th line from top read *Monodactylus* instead of *Mondactylus.* p. 214.

p. 214. 5th line from top read Machan.

p. 221. In 8th line from top read *mülleri* instead of *muelleri.*

ibid. In 9th line from top read Check-List instead of Chek-List.

p. 223. Fig. 58 *Kyphosus waigiensis* (A.G.) must be Fig. 58 *Kyphosus vaigiensis* (Q.G.).

p. 224. In 4th line from top read *K. vaigiensis* instead of *Kyphosus waigiensis.*

p. 229. In 12th line from top read Pinang instead of Pianang.
p. 230. In first line add 2. before **Proteracanthus.**
p. 235. In 9th line from top read *Mirolabrichthys* instead of *Microlabrichthys.*
p. 306. In 17th line from top read 8. **Caesio caerulaureus** Lac. instead of 8. **Caesio coerulaureus** Lac.
ibid. In 18th line the same.
p. 322. In first line from top read palate instead of plate.
ibid. Third line of key read 2. *M. waitei* instead of 2. *M. watei.*
p. 339. In 16th line from bottom read *ellipticus* instead of *ellepticus.*
p. 380. In last line of the note read *Leiopsis* instead of *Leopsis.*
p. 382. In 6th line from bottom read *bifasciatus* instead of *bifaciatus.*
p. 387. In 6th line from top read *P. hellmuthi* instead of *L. hellmuthi.*

ALPHABETICAL INDEX

OF

VERNACULAR NAMES 1)

Andjong-tandjong 384
Babal 192
Bandéra 39
Bangbangan 267
Bawal-Kundjong 188
Bawang 307
Bekukung 472
Betok lawut 342
Biber-tebel 413
Bindang 9
Blibiran 201
Bunga waru 209
Dabie 181
Dajong-Dajong 181
Darongan 267
Daun-baru 194
Dawon lisseh 267
Delis 267
Djamben 362
Djambiam 251
Djambian 248, 253, 256
Djarang-gigi 495, 502
Djenahah 245, 248, 262, 272, 274, 285
Dolossi 267
Dumbak 429
Ekor kuning 299
Ekor kuning pisang 302
Empasee 385
Gabal 188
Gadja-kuning 281
Gadji 414, 425, 429
Gaga 289
Gampret 192, 194
Gampret gĕbĕl 188, 191
Ganglomo 517, 545
Garut 404
Gayam 39, 172
Gigi-djaram 510
Gigi-djarang 489, 493, 504
Gomah-gomah 504
Gorara 259, 272, 274, 282
Gorara-furo 272
Gorara-furu 282
Gorara siang 259, 282
Gorara tikus 259
Grabak 493, 510
Gresik 362
Gulama 545
Gulamah 502, 504
Gurisi merah 359, 362, 375
Gurusi merah 380
Ikan merah 267
Kakap batu 460
Kakap merah 267
Kakap telassi 460
Kambing 137
Kanglomo 504
Kapas 472
Karbo 45
Katombal 472
Katoprak 480
Kekemeh 535

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1) As in Java the three languages: javanese, sundanese and malay are spoken, we have accordingly placed behind the indigenous names (Malay.), (Sundan.) or (Javan.) In naming a fish the malay people use as a rule „ikan" = fish before the special name. In most cases we have omitted „ikan".

Kelałah 285
Kelellet 267
Kèpè-Kèpè Tikar 92
Kepper 9
Kepper-Łaut 30, 34, 68, 75
Kèrong bali 287
Keronker 493
Ketamba 245
Kétang-Kétang 9
Kettang-Kettang 181
Kipa 92
Kipar 9
Kiper 9, 34, 49, 181
Kiper-Laut 30, 181
Kipper-laut 21
Kittam 9
Klotok 493
Krokot 404, 543
Krot 404
Krot-krot 402, 407
Kupu-Kupu 188
Kutut 342
Laubidi 248
Laubini 248
Lawabini 248
Lemah 545
Lensa 495
Lépé-Lépé 75
Lepi 299
Leutjan 454
Lĕvovangan 352
Ling-tjam (Chinese) 444, 449, 451, 452, 454
Mailah 277
Mata-hari 444, 449, 451, 452, 454
Melontok 493
Mengantih 404
Mohung 384
Moros 267
Nona-sosal 282
Nonda 272
Okeh 472
Papatik 181
Papeh 194
Pasir-Passir 390
Passir 385
Passir-passir 328, 333, 334, 335, 337, 340, 342, 345, 346, 359, 362, 375, 380, 384, 388
Patipo 178
Pelabatu 413, 460
Petehan 245
Petja piring 502
Pinjalo 294
Pisang-pisang 301, 303, 304, 307
Popondak 407
Radja bau 417, 419, 429
Remong 259
Rintsior 232
Salampri 502
Sampang 460
Sengat 480
Sepah 267
Sidemo 345, 346
Siliman 543
Somassi 248
Sumpit 201, 204
Taferbor 194
Tambak 281
Tambak merah 267
Tambangan 245, 267
Tambareh 517
Tanda 272
Tanda-Tanda 251, 259, 282
Tandu 265
Tapi-Tapi 181
Tassopah 267
Taweh 181
Tebèl 181
Tembola 267
Tembota 287
Temburut 477
Terusan 523
Tètèt 493
Tigowodjo 493, 504, 510, 517, 522, 535, 543, 545
Tjabak watu 460
Tjabe-watu 245
Tjablikan 282
Tokotok 522
Tudjong-prio 192
Tutung ikuh 281
Tontong 345
Towoito 404

ALPHABETICAL INDEX

OF

GENERA AND SPECIES

abbreviata, Acanthocepola 553
abbreviata, Cepola 553
abhortani, Chaetodon 87
Acanthocepola 553
Acanthocepola abbreviata 553
Acanthochaetodon 129
Acanthochaetodon alternans 142
Acanthochaetodon annularis 135
Acanthochaetodon imperator 133
Acanthochaetodon lepidolepis 142
Acanthochaetodon nicobariensis 132
Acanthochaetodon semicirculatus 142
Acanthochaetodon septentrionalis 128
Acanthochaetodon striatus 137
Acanthopodus boddaerti 157
Acanthopodus argenteus 207
Acanthurinae 174
Acanthurus 174
Acronuri 174
aculetum, Pristipoma 400
acuminatus, Chaetodon 37
acuminatus, Heniochus 36, 37
acutus, Lethrinus 436
adustus, Pempheris 217
affine, Diagramma 411
affinis (Euelatichthys) 411
affinis, Plectorhynchus 411
affinis, Scolopsis 345
africana, var. of Drepane punctata 180
albida, Corvina 517
albida, Pseudosciaena 517
albida, Sciaena 517
albipunctatus, Platax 185
alboguttata, Diacope 287
albovittatum var. of Diagramma lineatum 422
albovittatus, Plectorhinchus 422
albovittatus, Plectorhynchus 410, *422*
Alphestes gembra 246
Alphestes sambra 246
alternans, Acanthochaetodon 142
alternans, Holacanthus 131, 141
alternans var. of Holacanthus semicirculatus 142
altipinnis, Pimelepterus 224
altivelis, Coradion 30
amblycephalus, Umbrina 542
amblyceps, Corvina 486
amblyceps, Pseudosciaena 505
Amblytoxotes 195
(Amblytoxotes) squamosus 195
amboinensis var. of Genicanthus lamarck 152
amboinensis, Genyoroge 257, 259
amboinensis, Lethrinus 432, 435, 438, 450
amboinensis, Lutjanus 260
amboinensis, Mesoprion 259
Anacyrtus 212
anaeus, Pseudosciaena 509
anagon, Platax 186
analis, Diacope 279
anea, Pseudosciaena 508
anei, Corvina 508, 517
anei, Johnius 508, 517
Anemura 352
(Anemura) notatus 361

aneus, Argyrosomus 509
aneus, Johnius 508
aneus, Otolithus 508
aneus, Pseudosciaena 506, *508*
aneus, Sciaena 508
Angelichthys 154
Anisochaetodon 16, *94*
Anisochaetodon auriga *103*
Anisochaetodon chrysurus *111*
Anisochaetodon falcula *116*
Anisochaetodon kleini *99*
Anisochaetodon lineolatus *114*
(Anisochaetodon) mertensi 112
Anisochaetodon rafflesi 2, *109*
Anisochaetodon trivirgatus *101*
Anisochaetodon unimaculatus *97*
Anisochaetodon vagabundus *106*
Anisochaetodon vagabundus var. pictus 107
annularis, Acanthochaetodon 135
annularis, Chaetodon 135
annularis, Diacope 265
annularis, Holacanthus 135
annularis, Lutianus 266
annularis, Lutjanus 255
annularis, Mesoprion 265
annularis, Pomacanthodes *135*
annularis, Pomacanthus 132, *135*
Anthias bilineatus 339
Anthias johni 244
Anthias maculatus 400
Anthias multidens 314
Anthias orientalis 425
Anthias vosmeri 341
Anthias zonatus 315
Anthiinae 322
Aphareus 235, *317*
Aphareus caerulescens 318
Aphareus flavivultus 318
Aphareus furcatus *318*, 319
Aphareus rutilans 318, *319*
Aphareus thompsoni 319
Apogonidae 555
Apolemichthys 154
(Apolemichthys) trimaculatus *155*
Aprion 235, *310*, 315
Aprion microlepis 311, *312*
Aprion pristipoma 314
Aprion typus 311, *313*
Aprion virescens *311*
aquila, Sciaena 486
arabica, subsp. of Chaetodon trifasciatus 67
arabica var. of Chaetodon trifasciatus 67
arcuatus, Chaetodon 129
argentata, Perca 246
argentata, Sciaena 246
argentatus, Labrus 246
argentea, Corvina 521
argentea, Sciaena 520
argenteum, Pristipoma 403
argenteus, Acanthopodus 207
argenteus, Caesio 317
argenteus, Chaetodon 207
argenteus, Monodactylus *207*
argenteus, Otolithes 488, *492*
argenteus, Otolithus 488, 492
argenteus, Pristipoma 403
argenteus, Psettus 207
argentimaculata, Diacope 246
argentimaculata, Sciaena 246
argentimaculatus, Lutianus 247
argentimaculatus, Lutjanus 236, *246*
argus, Cacodoxus 6
argus, Chaetodon 6
argus, Ephippus 6
argus, Scatophagus 3, *6*, 13
argyreum, Pristipoma 406
argyreus, Pomadasys 398 *406*
argyrogrammicus, Etelis 314
argyrogrammicus, Pristipomoides 314
argyrogrammicus, Serranus 313
Argyrops 465
Argyrops longifilis 467
Argyrops spinifer 467
Argyrosomus 487
Argyrosomus aneus 509
Argyrosomus goldmani 507
aries, Chrysophrys 468
aries, Sparus 468
Aronurus 174
arthriticus, Platax 185, 191
Arusetta 146

astur var. a, Holacanthus 137
atratus, Chaetodon 123
atro-maculatus, Chaetodon 6
auctorum, Lobotes 459
aurantiaca, Diacope 279
aurantius, Lutjanus 425
aurata, Perca 341
aurata, Scolopsis 341
auratus, Scolopsis 341
aureovittatus, Lutjanus 341
aureus, Chaetodon 91
auriga, Anisochaetodon *103*
auriga, Chaetodon 94, 103
auriga, Linophora 96, *103*
auriga, Sarothrodus 104
auriga, Tetragonopterus 104
auriga, Tetragonoptrus 104
auripes, Chaetodon 92
auritum, Pristipoma 408
auritus, Pomadasys 399, *408*
aurolineatus, Gnathodentex *348*
aurolineatus, Lethrinus 447
aurolineatus, Pentapus 348
aurolineatus, Pristipomoides 303
aurolineatus, Sparus 348, 381
aurolineatus var. of Caesio chrysozona 303
aurora, Chaetodon 117
aurora subsp. of Chaetodon ulietensis 117
australis, Chrysophrys 469
australis, Sparus 466, *469*
australis, Roughlegia 470
austriacus, Chaetodon 66
austriacus Citharoedus 66
austriacus subsp. of Chaetodon trifasciatus 67
austriacus var. of Chaetodon trifasciatus 67
axillaris, Diacope 279
axillaris, Bola 512
axillaris, Corvina 511
axillaris, Johnius 512
axillaris, Pseudosciaena 506, *511*
axillaris, Sciaena 511
balinensis, Dentex 375
balinensis, Nemipterus 356, *375*
balinensoides, Nemipterus 356, *376*
balinensoides, Synagris 376
balteatum, Diagramma 427
baronessa, Chaetodon 48
baronessa, Sarothrodus 48
baronessa, Tetragonoptrus 48
batavianus, Platax 185, *191*
bataviensis, Platax 191
bateatus, Plectorhynchus 427
Bathyclupeidae 559
Bedula 476
Bedula nebulosus 477
belangeri, Corvina 533
belangeri, Johnius 533
belangeri, Sciaena 533
Belangerii, Corvina 533
belengeri, Corvina 533
belengeri, Johnius 527, *533*
belengeri, Sciaena 533
belengerii, Corvina 533
belengerii, Johnius 533
bella-maris, Chaetodon *93*
bella-maris, Chaetodontops 56, *93*
bellulus, Chaetodon 80
bellus, Chaetodon 66
Benettia 235
(Benettia) johnii 244
bengalensis, Genyoroge 257
bengalensis, Holocentrus 256
bengalensis, Lutjanus 257
bengalensis, Mesoprion 257
bennetti, Chaetodon *62*
bennetti, Coradion 63
bennetti, Rhabdophorus 54, *62*
Bennetti, Sarothrodus 63
Bennetti, Tetragonoptrus 63
bennettii, Chaetodon 63
berda, Chrysophris 470
berda, Chrysophrys 470
berda, Pagrus 471
berda, Sparus 466, *470*
biaurita, Collichthys 495, 501
biauritus, Collichthys 500
biauritus, Otolithoides *500*
biauritus, Otolithus 500
biauritus, Sciaenoides 500
bicolor, Centropyge 160, *161*

bicolor, Chaetodon 161
bicolor, Chaetodontoplus 162
bicolor, Holacanthus 162
bidens, Genyoroge 263
bifascialis, Chaetodon 51
bifascialis, Megaprotodon 51
bifasciata, Chrysophrys 473
bifasciatus, Chaetodon 37, 473
bifasciatus, Chrysophris 473
bifasciatus, Heterognathodon 382
bifasciatus, Pagrus 473
bifasciatus, Sparus 466, *473*
biguttatus, Epinephelus 255
biguttatus, Lutjanus 237, *255*
biguttatus, Serranus 255
bilineata, Scolopsis 339
bilineatus, Anthias 339
bilineatus, Scolopsides 339
bilineatus, Scolopsis 327, *339*
bimaculatus, Scolopsis 334, 344
binotatus, Coius 462
biocellatus, Chaetodon 83
biocellatus, Tetragonopterus 84
biocellatus, Tetragonoptrus 84
bipunctatus, Dentex 369
birtwistlei, Johnius 510
birtwistlei, Pseudosciaena 506, *510*
bishopi, Holacanthus 133
bispinosus, Centropyge 160, *165*
bispinosus, Holacanthus 165
bispinosus, Otolithus 493
bispinosus, Holacanthus 157
bitaeniata, Diacope 278
bleekeri, Kyphosus 228
Bleekeri, Lethrinus 450
bleekeri, Mesoprion 255
Bleekeri, Scolopsis 336, 339
bleekeri, Synagris 372
Bleekeri, Synagris sp. aff. 372
blekeri, Synagris 372
blochi, Euthyopteroma 369
Blochi, Platax 189
Blochii, Dentex 369
blochii, Diagramma 422
Blochii, Lutjanus 251
Blochii, Platax 189
blochii, Plectorhynchus 427
blythi, Toxotes 199, 202
boddaerti, Acanthodopus 157
boddaerti, Chaetodon 157
Bodian cuvieri 418, 423
?Bodianus leutjanus 451
Boersii, Platax 185
bohar, Diacope 276
bohar, Lutianus 276
bohar, Lutjanus 239, *276*
bohar, Sciaena 276
Bola 486, 505
Bola axillaris 512
Bola coibor 517
bola, Cyprinus 486
Bola ossea 541
Bola pama 495, 496
bonhamensis, Lethrinus 450
borneensis, Johnius 523
borneensis, Nandus 477
borneensis, Otolithus 523
borneensis, Pseudosciaena 507, *523*
borneensis, Sciaena 523
bosci, Pimelepterus 222
bottonensis, Diacope 263
bottonensis, Genyoroge 263
bottonensis, Mesoprion 263
Bougainvillii, Scatophagus 6
boutton, Holocentrus 263
Bowersia 310
Brama 195
Branchiostegidae 547
brunneus, Collichthys 502
brunneus, Otolithoides, 500, *502*
brunneus, Otolithus 502
brunneus, Sciaenoides 502
bungus, Lethrinus 444
butonensis, Lutjanus 263
Cacodoxus 6
Cacodoxus argus 6
Cacodoxus tetracanthus 9
caerulaureus, Caesio 296, 306
caeruleolineatus, Lutjanus 257
caeruleopunctata, Genyoroge 288
caerulescens, Aphareus 318
caerulescens, Holacanthus 141
Caesio 234, *294*, 322
Caesio argenteus 317

Caesio caerulaureus 296, 306
Caesio chrysosoma aurolineatus 304
Caesio chrysozona 296, *303*, 306
Caesio chrysozona var. aurolineatus 303
Caesio chrysozonus 304
Caesio coerulaureus 303, *306*
Caesio cuning 298
Caesio cylindricus 298
Caesio diagramma 296, *305*
Caesio erythrochilurus 298
Caesio erythrogaster 296, *298*, 301, 302
Caesio erythropterus 298
Caesio gymnopterus 316
Caesio lunaris 296, 298, *299*
Caesio maculatus 306
Caesio multiradiatus 296
Caesio pinjalo 293
Caesio pisang 296, *302*
Caesio striatus 303
Caesio teres 301
Caesio tile 295, *296*
Caesio xanthonotus 296, *301*
calamara, Chrysophrys 470
calamara, Sparus 471
calus, Coius 244
calveti, Diacope 263, 268, 279
calveti, Mesoprion 269
cancellata, Scolopsis 336
cancellatus, Scolopsides 336
cancellatus, Scolopsis 327, *335*
canescens, Chaetodon 172
canescens, Pomacanthus 172
canescens, Zanclus 170, *172*
caninus, Heterognathodon 389
caninus, Pentapus *382*
caninus, Scolopsides 382
caninus, Scolopsis 382
Cantharus filamentosus 369
Cantharus lineolatus 474
cantor, Johnius 541
Cantori, Johnius 538, 541
Carangi 555
Caranxomorus sacrestinus 318
carinatus, Lethrinus 453
caripa, Pristipoma 400
carlsmithi, Rhyacanthias 309
caroui, Mesoprion 253
carouna, Corvina 529
carutta, Corvina 529
carutta, Johnius 527, *529*
carutta, Labrus 529
castelnaui, Lutjanus 263
catalea, Corvina 515
catalea, Johnius 515
cataleus, Johnius 515
Catalufa 211
Catopra 478
Catopra fasciata 479
Catopra grooti 480
Catopra grootii 480
Catopra nandioides 479
Catopra nandoides 479
Catopra siamensis 479
caudibicolor, Holacanthus 153
caudifasciatus subsp. of Chaetodon trifasciatus 67
caudovittatus, Holacanthus 153
celebica, Corvina 520
celebicus, Dentex 362
celebicus, Diagramma 420
celebicus, Johnius 520
celebicus, Nemipterus 354, *362*
celebicus, Plectorhynchus 410, *420*
celebicus, Synagris 362
Centrogaster rhombeus 207
centrognathum, Gnathocentrum 172
centrognathus, Zanclus 172
Centropodus rhombeus 207
Centropomidae 556
Centropomus hober 270
Centropristis pristipoma 314
Centropyge 122, *159*
Centropyge bicolor 160, *161*
Centropyge bispinosus 160, *165*
Centropyge diacantha 157
Centropyge multifasciatus 160, *161*
Centropyge nox 160, *164*
Centropyge tibicen 160, *163*
Centropyge tutuilae 166
Centropyge vrolicki 167
Centropyge vroliki 160, *167*

centurio, Diagramma 427
centurio, Lethrinus 453
Cepola 552
Cepola abbreviata 553
Cepolidae 552, 559
Chaetodipterus 176, 182
Chaetodipterus orbis 177
Chaetodon 13, 16, 36, *52*
Chaetodon abhortani 87
Chaetodon acuminatus 37
Chaetodon annularis 135
Chaetodon arcuatus 129
Chaetodon argenteus 207
Chaetodon argus 6
Chaetodon atratus 123
Chaetodon atro-maculatus 6
Chaetodon aureus 91
Chaetodon auriga 94, 103
Chaetodon auriga subsp. setifer 104
Chaetodon auripes 92
Chaetodon aurora 117
Chaetodon austriacus 66
Chaetodon baronessa 48
Chaetodon bella-maris *93*
Chaetodon bellulus 80
Chaetodon bellus 66
Chaetodon bennetti *62*
Chaetodon bennettii 63
Chaetodon bicolor 161
Chaetodon bifascialis 51
Chaetodon bifasciatus 37, 473
Chaetodon biocellatus 83
Chaetodon boddaerti 157
Chaetodon canescens 172
Chaetodon chrysozonus 28, 30
Chaetodon chrysurus 82, 161
Chaetodon chrysurus subsp. madagascariensis 112
Chaetodon chrysurus subsp. paucifasciatus 112
Chaetodon chrysurus subsp. xanthurus 112
Chaetodon citrinellus *76*, 79, 81
Chaetodon citrinellus nigripes 77
Chaetodon citrinellus subsp. nigripes 77
Chaetodon citrinellus var. semipunctatus 77, 82
Chaetodon collare 83, *91*
Chaetodon collare var. duplicicollis 91
Chaetodon collare var. Kneri 93
Chaetodon collare var. parallelus 91
Chaetodon collare var. praetextatus 91
Chaetodon collaris 91
Chaetodon cordiformis 98
Chaetodon cornutus 170
Chaetodon decussatus 106
Chaetodon diacanthus 157
Chaetodon dixoni 113
Chaetodon dizoster 117
Chaetodon dolosus 83
Chaetodon dorsalis 87
Chaetodon dux 157
Chaetodon enceladus 20
Chaetodon ephippium *59*
Chaetodon ephippium var. principalis 60
Chaetodon excelsus 41
Chaetodon falcatus 180
Chaetodon falcula 116
Chaetodon fasciatus 84
Chaetodon festivus 31
Chaetodon flavescens 99
Chaetodon garnoti 59
Chaetodon garretti 82
Chaetodon güntheri *79*
Chaetodon guttatissimus 81, 111
Chaetodon imperator 132
Chaetodon kleinii 99
Chaetodon klunzingeri 66
Chaetodon labiatus 28
Chaetodon Layardi 66
Chaetodon leachii 51
Chaetodon lineolatus 114
Chaetodon lineolatus var. oxycephalus 115
Chaetodon longimanus 180
Chaetodon longirostris 17
Chaetodon lunatus 115
Chaetodon lunula *83*, 109
Chaetodon lunulatus 83

Chaetodon macrolepidotus 37
Chaetodon maculiceps 58
Chaetodon marginatus 87
Chaetodon melammystax 99
Chaetodon melanopus 30
Chaetodon melanotus *87*
Chaetodon melapterus 69
Chaetodon melastomus 99
Chaetodon mertensii 112
Chaetodon mesoleucus 123
Chaetodon mesomelas 123
Chaetodon meyeri *69*
Chaetodon microlepis 139
Chaetodon miliaris 77, 79, *80*
Chaetodon mulsanti 59
Chaetodon multicinctus 75
Chaetodon nesogallicus 106
Chaetodon nicobariensis 132
Chaetodon nigricans 185
Chaetodon nigripes 77
Chaetodon occellatus 84
Chaetodon ocellatus 33, 84
Chaetodon ocellicauda 89
Chaetodon octofasciatus *72*
Chaetodon octolineatus 73
Chaetodon oligacanthus 32, 33
Chaetodon orbicularis 189
Chaetodon orbis 177
Chaetodon ornatissimus *71*
Chaetodon ornatissimus var. Kaupi 71
Chaetodon ornatus 71
Chaetodon ovalis 66
Chaetodon oxycephalus 115
Chaetodon parallelus 91
Chaetodon pentacanthus 189
Chaetodon pepek 66
Chaetodon pictus 106
? Chaetodon pinnatus 192
Chaetodon plebeius *56*
Chaetodon plebejus 56
Chaetodon plectorhynchus 413
Chaetodon polylepis 25
Chaetodon praetextatus 91
Chaetodon princeps 109
Chaetodon principalis 59
Chaetodon punctato-fasciatus *75*
Chaetodon punctato-fasciatus subsp. multicinctus 75
Chaetodon punctatus 76, 180
? Chaetodon punctulatus 77
Chaetodon quadrifasciatus 462
Chaetodon rafflesi 109
Chaetodon rafflesii 110
Chaetodon reinwardti 88
Chaetodon resimus 147
Chaetodon reticularis 93
Chaetodon rostratus 20, 197, 199
Chaetodon sebae 110
Chaetodon sebanus 103
Chaetodon selene *90*
Chaetodon semeion *61*
Chaetodon setifer 103
Chaetodon setifer var. hawaiiensis 105
Chaetodon setosus 193
Chaetodon speculum 58, *64*
Chaetodon sphenospilus 98
Chaetodon spilopleura 64
Chaetodon striangulus 51
Chaetodon strigangulus 51
Chaetodon strigatus 22
Chaetodon Tallii 115
Chaetodon tau-nigrum 66
Chaetodon teira 185
Chaetodon tetracanthus 9, 12
Chaetodon townleyi 33
Chaetodon triangularis 51
Chaetodon triangulum 48
Chaetodon tricolor 154
Chaetodon trifascialis 51
Chaetodon trifasciatus 51, *66*
Chaetodon trifasciatus subsp. arabica 67
Chaetodon trifasciatus subsp. austriacus 67
Chaetodon trifasciatus subsp. caudifasciatus 67
Chaetodon trifasciatus var. arabica 67
Chaetodon trifasciatus var. austriacus 67
Chaetodon trifasciatus var. Klunzingeri 66

Chaetodon ulietensis 117

Chaetodon ulietensis subsp. aurora 117

Chaetodon ulietensis var. confluens 117

? Chaetodon unifasciatus 91

Chaetodon unimaculatus 97

Chaetodon unimaculatus subsp. interruptus 98

Chaetodon unimaculatus subsp. sphenospilus 98

Chaetodon vagabundus 106

Chaetodon vagabundus var. jordani 108

Chaetodon vagabundus var. pictus 107

Chaetodon verticosus 135

Chaetodon vespertilio 189

Chaetodon vinctus 62

Chaetodon virescens 99

Chaetodon viridis 91

Chaetodon vittatus 66

Chaetodon wiebeli 84

Chaetodon xanthurus 111

Chaetodon Zanzibariensis 65

Chaetodon zoster 25

chaetodonoides, Lutjanus 413

chaetodonoides, Plectorhinchus 413

chaetodonoides, Plectorhynchus 410, *413*

Chaetodontidae *1*, 3, 169, 557, 558, 559

Chaetodontinae 2, *13*, 119

chaetodontoides, Diagramma 413

chaetodontoides, Plectorhinchus 413

Chaetodontoplus 121, *122*

Chaetodontoplus bicolor 162

Chaetodontoplus dimidiatus 126

Chaetodontoplus duboulayi 125

Chaetodontoplus dubouleyi 123, *125*

Chaetodontoplus chrysocephalus 127

Chaetodontoplus melanosoma 123, *126*

Chaetodontoplus mesoleucus *123*

Chaetodontoplus septentrionalis 123, *127*

Chaetodontops *55*, 83

Chaetodontops bella-maris 56, *93*

Chaetodontops collare 56, *91*

Chaetodontops lunula 55, *83*

Chaetodontops melanotus 56, *87*

Chaetodontops selene 56, *90*

Chaetopterus 310

Chaetopterus microchir 311

Chaetopterus microlepis 312

Chaetopterus pristipoma 314

chaleareus, Toxotes 204

chapmani, Holacanthus 152, 153

chaptis, Corvina 515

chaptis, Johnius 515

Characinidae 212

chatareus, Toxotes 197, 198, *203*

Chelmo 18

Chelmo longirostris 17

? Chelmo pulcher 20

Chelmo rostratus 20

Chelmon 2, 13, 14, 15, *18*

Chelmon lol 17

Chelmon longirostris 17

Chelmon marginalis 21

Chelmon Mülleri 21

Chelmon rostratus *20*, 197

chirtah, Lutjanus 266

chirtah, Mesoprion 265

choerorhynchus, Sparus 442

Chumchum var. of Lethrinus nebulosus 453

chrysobalion, Pristipoma 402

chrysocephalus, Chaetodontoplus, 127

chrysocephalus, Holacanthus 127

Chrysophris 465

Chrysophris berda 470

Chrysophris bifasciatus 473

Chrysophrys aries 468

Chrysophrys australis 469

Chrysophrys berda 470

Chrysophrys bifasciata 473

Chrysophrys calamara 470

Chrysophrys datnia 471

Chrysophrys grandoculis 350

Chrysophrys haffara 468

Chrysophrys hasta 471

Chrysophrys sarba 468

Chrysophrys spinifera 467

chrysostoma aurolineatus, Caesio 304
chrysostoma, Diphreutes 40
chrysostoma, Heniochus 40
chrysostomus, Diphreutes 40
chrysostomus, Heniochus 40
chrysostomus, Taurichthys 40
chrysotaenia, Diagramma 419
chrysotaenia, Lutjanus 237, *248*, 260
chrysotaenia, Mesoprion 248
chrysotaenia, Plectorhynchus 410, *419*, 422
chrysozona, Caesio 296, *303*, 306
chrysozonus, Caesio 304
chrysozonus, Chaetodon 28, 30
chrysozonus, Coradion, *28*, 31, 88
chrysozonus, Tetragonopterus 28
chrysurus, Anisochaetodon *111*
chrysurus, Chaetodon, 82, 161
chrysurus, Holacanthus 139
chrysurus, Linophora 96
chrysurus, Pomacanthodes *139*
chrysurus, Pomacanthus 132, *139*
chrysurus, Tetragonoptrus 111
ciliata, Scolopsis 332
ciliatus, Holocentrus 332
ciliatus, Scolopsis 326, *332*
cinerascens, Diagramma 426
cinerascens, Kyphosus 223, *224*
cinerascens, Pimelepterus 224
cinerascens, Sciaena 224
cinereus, Lethrinus 456
cirrhosa, Sciaena 541
Citharoedus *54*, 69
Citharoedus austriacus 66
?Citharoedus mertensi 111
Citharoedus meyeri 54, *69*
Citharoedus octofasciatus 73
Citharoedus ornatissimus 54, *71*
Citharoedus punctato-fasciatus 75
Citharoedus speculum 64
?Citharoedus spilopleura 64
Citharoedus taunigrum 66
Citharoedus triangulum 48
Citharoedus unimaculatus 98
Citharoedus vittatus 66
citrinellus, Chaetodon *76*, 79, 81
citrinellus nigripes, Chaetodon 77
citrinellus, Tetragonopterus *76*
citrinellus, Tetragonoptrus 55, *76*
citrinus, Lobotes 459
coccinea, Diacope 263
cocosensis, Lethrinus 451
coerulaureus, Caesio 303, 306
coeruleopunctata, Diacope 287
coeruleopunctatus, Mesoprion 288
coeruleus, Holacanthus 137, 141
Coesio lunaris 299
coibor, Bola 517
coibor, Johnius 485, 517
coibor, Pseudosciaena 507, 517
coibor, Sciaena 517
Coius binotatus 462
Coius calus 244
Coius datnia 473
Coius gridgutia 402
Coius polota 460, 462
Coius quadrifasciatus 462
collare, Chaetodon 83, *91*
collare, Chaetodontops 56, *91*
collaris, Chaetodon 91
collaris, Tetragonoptrus 91
Collichthys 495, 499
Collichthys biaurita 495, 501
Collichthys biauritus 500
Collichthys brunneus 502
Collichthys lucida 495
Collichthys microdon 503
Collichthys pama 496
comes, Corvina 537
Commersoni, Labrus 402
commersoni, Pristipoma 402
Commersonii, Psettus 207
confluens var. of Chaetodon ulietensis 117
Coradion 13, 15, *27*
Coradion altivelis 30
Coradion bennetti 63
Coradion chrysozonus *28*, 31, 88
Coradion melanopus, 28, *30*
cordiformis, Chaetodon 98
cornutus, Chaetodon *170*
cornutus, Zanclus *170*
Corvina 526
Corvina albida 517

Corvina amblyceps 486
Corvina anei 508, 517
Corvina argentea 521
Corvina axillaris 511
Corvina belangeri 533
Corvina Belangerii 533
Corvina belengeri 533
Corvina belengerii 533
Corvina carouna 529
Corvina carutta 529
Corvina catalea 515
Corvina celebica 520
Corvina chaptis 515
Corvina comes 537
Corvina diacanthus 515
Corvina dorsalis 520
Corvina dussumieri 530
Corvina fauveli 536
Corvina goldmanni 507
Corvina jubata 527
Corvina Kuhlii 532, 533
Corvina lobata 533
Corvina macrophthalmus 508
Corvina maculata 538
Corvina miles 520
(Corvina) mülleri 521
Corvina neilli 517
Corvina nigromaculata 516
Corvina novae-Hollandiae 537
Corvina papuensis 512
Corvina plagiostoma 525
Corvina polycladiscus 519
Corvina polykladiskos 519
Corvina sampitensis 520
Corvina semiluctuosa 535
Corvina sina 513
Corvina soldado 520
Corvina trachycephalus 528
Corvina Wolffii 520
Coryphaena 175
Coryphaenidae 559
crassilabre, Diagramma 411
crassispina, Plectorhynchus *410*
crassispinum, Diagramma 410
crassispinus, Euelatichthys 411
crassispinus, Plectorhinchus 411
crassispinus, Plectorhynchus 411
Crenidens spec. 231
Crenidens sarissophorus 230
Cryptosmilia luna 180
cuning, Caesio 298
cuning, Cychla 298
cuning, Sparus 298
cutambi, Lethrinus 452
cuvieri, Bodian 418, 423
cuvieri, Diagramma 423
cuvieri, Plectorhynchus 410, 418, *423*
?Cychla cuning 298
cylindricus, Caesio 298
Cyprinus bola 486
darwiniensis, Holacanthus 125
datnia, Chrysophrys 471
datnia, Coius 473
datnia, Sparus 471
Datnioides 457, 460
Datnioides microlepis 462, *463*
Datnioides polota 462
Datnioides quadrifasciatus *462*
decemlineata, Diacope 256
decemlineatus, Evoplites 257
decussatus, Chaetodon 106
decussatus, Lutjanus 240, *285*
decussatus, Mesoprion 285
decussatus, Serranus 285
Dentex 292, 352, 375
Dentex balinensis 375
Dentex bipunctatus 369
Dentex Blochii 369
Dentex celebicus 362
Dentex filamentosus 354, 369
Dentex filifer 384
Dentex furcosus 359
Dentex gracilis 380
Dentex griseus 391
? Dentex guliminda 369
Dentex hexodon 360
Dentex hypselognathus 357
Dentex isacanthus 361
Dentex lethrinoides 391
dentex, Lutjanus 314
Dentex lycogenis 348
Dentex marginatus 372
dentex, Mesoprion 314
Dentex mesoprion 373

Dentex metopias 365
Dentex microdon 391
Dentex mulloides 367
Dentex nematophorus 366
Dentex nematopus 372
Dentex nemurus 364
Dentex notatus 361
Dentex obtusus 367
Dentex Ovenii 359
Dentex Peronii 357
Dentex pristipoma 314
Dentex ruber 360, 380
Dentex sumbawensis 377
Dentex sundanensis 358
Dentex taeniopterus 361
Dentex tambuloides 374
Dentex tambulus 358, 369
Dentex tolu 367
Dentex upeneoides 379
Dentex vaigiensis 292
Dentex xanthopterus 391
Dentex zysron 378
Desmoprenes tetracanthus 10
diacantha, Centropyge 157
diacanthus, Chaetodon 157
diacanthus, Corvina 515
diacanthus, Holacanthus 156, 157, 165
diacanthus, Johnius 515
diacanthus, Lutjanus 515
diacanthus, Pseudosciaena 507, *515*
diacanthus, Sciaena 515
diacanthus, Pygoplites *157*
Diagramma 409
Diagramma affine 411
Diagramma balteatum 427
Diagramma blochii 422
diagramma, Caesio 296, *305*
Diagramma celebicus 420
Diagramma centurio 427
Diagramma chaetodontoides 413
Diagramma chrysotaenia 419
Diagramma cinerascens 426
Diagramma crassilabre 411
Diagramma crassispinum 410
Diagramma cuvieri 423
Diagramma gibbosum 411
Diagramma gibbosus 410
Diagramma Goldmanni 418
Diagramma haematochir 418
Diagramma labiosum 427
Diagramma Lessoni 416
Diagramma lessonii 423
Diagramma lineatum 416, 426
Diagramma lineatum var. albovittatum 422
? Diagramma multivittata 418
Diagramma nigrum 411
Diagramma ocellatum 427
Diagramma orientale 425
Diagramma Papuense 413
Diagramma pardale 413
Diagramma pardalis 413
diagramma, Perca 415
Diagramma pica 425
? Diagramma picoides 425
diagramma, Plectorhinchus 416, 423
Diagramma pictum 427
diagramma, Plectorhynchus 423, 428
diagramma, Plectorhynchus 416
Diagramma plectorhynchus 413
Diagramma poecilopterum 427
Diagramma polytaenia 414
Diagramma polytaenioïdes 414
Diagramma punctatum 426
Diagramma punctulatum 427
Diagramma radja 416
Diagramma Sebae 423
Diagramma Sibbaldi 425
Diagramma unicolor 411
Diacope 235, 292
Diacope alboguttata 287
Diacope analis 279
Diacope annularis 265
Diacope argentimaculata 246
Diacope aurantiaca 279
Diacope axillaris 279
Diacope bitaeniata 278
Diacope bohar 276
Diacope bottonensis 263
? Diacope calveti 263, 268, 279
Diacope coccinea 263
Diacope coeruleopunctata 287
Diacope decemlineata 256

Diacope Ehrenbergi 242
Diacope flavipes 279
Diacope fulviflamma 270
Diacope gibba 263
Diacope immaculata 279
Diacope kasmira 257
Diacope lineata 263, 281
Diacope lineolata 253
Diacope macolor 289
Diacope marginata 279
Diacope melanura 263
Diacope metallicus 265
Diacope monostigma 284
Diacope nigra 289
Diacope notata 256
Diacope octolineata 256
Diacope olivaceus 252
Diacope quadriguttata 276
Diacope rivulata 287
? Diacope rosea 246
Diacope rubella 265
Diacope rufolineata 259
Diacope sanguinea 265
Diacope Sebae 261
Diacope siamensis 261
Diacope striata 263
? Diacope timoriensis 268
Diacope vaigiensis 279
Diacope vitta 250
Diacope xanthopus 279
Diacope xanthozona 244
dimidiatus, Chaetodontoplus 126
dimidiatus, Holacanthus 126
Diphreutes 35
Diphreutes chrysostoma 40
diphreutes, Heniochus 38
Diphreutes macrolepidotus 37
Diphreutes varius 42
Diphreutes viridis 42
dixoni, Chaetodon 113
dizoster, Chaetodon 117
dodecacanthoides, Lutjanus 238, *269*
dodecacanthoides, Mesoprion 269
dodecacanthus, Lutjanus 268
dodecacanthus, Mesoprion 268
dodecantheoides, Lutianus 266, 270
dolorosus, Otolithus 488
dolosus, Chaetodon 83
dorsalis, Chaetodon 87
dorsalis, Corvina 520
Drepana punctata 180
Drepane 179
Drepane longimana 180
Drepane punctata 180
Drepane punctata var. africana 180
Drepane punctata var. longimana 180
Drepanichthys 179
Drepanichthys punctatus 181
Drepaninae 2, 178
drepanoides, Heniochus 40
dubiosus, Scolopsis 327, 334, *344*
duboulayi, Chaetodontoplus 125
duboulayi, Holacanthus 125
dubouleyi, Chaetodontoplus 123, *125*
duplicicollis var. of Chaetodon collare 91,
dussumieri, Corvina 530
dussumieri, Johnius 527, *530*
dussumieri, Pimelepterus 224
dussumieri, Sciaena 531, 541, *542*
dussumieri, Umbrina 542
dux, Chaetodon 157
Ehrenbergi, Diacope 242
ehrenbergi, Lethrinus 455
ehrenbergi, Lutjanus 236, *242*
Ehrenbergi, Mesoprion 242
Ehrenbergi, Platax 189
ellipticus, Lutjanus 339
elongatus, Lethrinus 435
elongatus, Scolopsis 383
elongatus, Sparopsis 311
Emmelichthyidae 557
enceladus, Chaetodon 20
enneacanthus, Mesoprion 250
enneodactylus, Pomacentrus 341
Entonanthias 321
Entonanthias pascalus 322
Ephippinae 2, *175*
ephippium, Chaetodon *59*
ephippium, Rhabdophorus 53, 59
ephippium, Tetragonoptrus 60
Ephippus 6, 176

Ephippus argus 6
Ephippus falcatus 180
Ephippus melanopus 177
Ephippus orbis *177*
Ephippus tetracanthus 9
Epicyrtus 212
Epinephelus biguttatus 255
erate, Lobotes 459
erythrochilurus, Caesio 298
erythrogaster, Caesio 296, *298*, 301, 302
erythrogaster, Odontonectes 298
erythropterus, Caesio 298
erythropterus, Lutianus 266
erythropterus, Lutjanus 253, 265
erythropterus, Mesoprion 253, 292
erythrozona, Mesoprion 292
erythrurus, Lethrinus 448
erythrurus, Lethrinus 450
esculentus, Lethrinus 453
Eteira triangularis 51
? Etelis argyrogrammicus 314
euanus, Sphaerodon 351
(Euelatichthys) affinis 411
Euelatichthys crassispinus 411
Euthyopteroma 352
Euthyopteroma blochi 369
Euthyopteroma sumbawensis 377
Euxiphipops 121, *145*
Euxiphipops navarchus 146, *149*
Euxiphipops sexstriatus *146*
Euxiphipops xanthometopon 146, *148*
Evoplites 235
Evoplites decemlineatus 257
Evoplites kasmira 257
Evoplites pomacanthus 257
excelsa, Loa 41
excelsa, Roa 41
excelsus, Chaetodon 41
Exodon 212
expansus, Platax 193
faetela, Plectorhinchus 419, 420
faetela, Sciaena 422
falcatus, Chaetodon 180
falcatus, Ephippus 180
falciformis, Monodactylus 207, 209
falcula, Anisochaetodon *116*
falcula, Chaetodon 116
falcula, Oxychaetodon 97
falcula, (Oxychaetodon) 116
falcula, Pomacentrus 116
falcula, Tetragonopterus 117
falcula, Tetragonoptrus 117
Fares 317
(Fares)rutilans 320
farkhari, Lobotes 459
farkharii, Lobotes 459
fasciata, Catopra 479
fasciata, Pristolepis 480
fasciatus, Chaetodon 84
fasciatus, Lethrinus 452
fasciatus, Pristolepis *479*, 481
fasciatus, Scatophagus 9, 12
fasciatus, Tetragonopterus 84
fasciatus, Tetragonoptrus 84
fauveli, Corvina 536
festivus, Chaetodon 31
filamentosus, Cantharus 369
filamentosus, Dentex 354, 369
filamentosus, Heterognathodon 369
filamentosus, Pagrus 466
filamentosus, Pomacentrus 103
filamentosus, Synagris 369
filifer, Dentex 384
flavescens, Chaetodon 99
flavescens, Lethrinus 455
flavipes, Diacope 279
flavipes, Lutjanus 282
flavissimus, Forcipiger 17
flavivultus, Aphareus 318
flavo-niger, Holacanthus 69
Forcipiger 13, 15, 16
Forcipiger flavissimus 17
Forcipiger longirostris *17*
formosulus, Pentapus 387
forsteri, Sparus 395
forsteri, Symphorus 395
frenatus, Gymnocranius 391
frenatus, Lethrinus 441, 456
fulviflamma, Diacope 270
fulviflamma, Lutianus 271, 284
fulviflamma, Lutjanus 239, *270*, 272
fulviflamma, Mesoprion 270

fulviflamma, Perca 270
fulviflamma, Sciaena 270
furcatum, Pristipoma 399
furcatus, Aphareus *318,* 319
furcatus, Grammistes 399
furcatus, Labrus 318
furcatus, Pomadasys 398, *399,* 407
furcosus, Dentex 359
furcosus, Synagris 357, 361
furvicaudata, (Parkia) 281
furvicaudatus, Lutjanus 281
fuscescens, Lutianus 271, 273
fuscescens, Lutjanus 236, *241*
fuscescens, Mesoprion 241
fuscolineata, Umbrina 544
fuscus, Pimelepterus 228
Gaimardi, Mesoprion 279
Gaimardi, Platax 185
gampret, Platax 193
garnoti, Chaetodon 59
garretti, Chaetodon 82
garretti, Mesoprion 246
gembra, Alphestes 246
gembra, Lutianus 247
gembra, Lutjanus 246
gembra, Mesoprion 246
Genicanthus 121, 150
Genicanthus lamarck *151*
Genicanthus lamarckii 151
Genicanthus melanospilus 151, *153*
genivittatus, Lethrinus 436, 438
geometricus, Holacanthus 132
Genyoroge 235
Genyoroge amboinensis 257, 259
Genyoroge bengalensis 257
? Genyoroge bidens 263
Genyoroge bottonensis 263
Genyoroge caeruleopunctata 288
Genyoroge gibba 263
(Genyoroge) kasmira 257
Genyoroge lemniscata 272
Genyoroge macolor 289
Genyoroge marginata 279
Genyoroge melanospilos 259
Genyoroge melanura 263
Genyoroge nigra 289
Genyoroge notata 272
Genyoroge rivulata 288
Genyoroge sebae 261
? Genyoroge unicolor 263
ghanam, Grammistes 337
ghanam, Holocentrus 337
ghanam, Sciaena 337
ghanâm, Scolopsides 337
ghanam, Scolopsis 327, *337*
gibba, Diacope 263
gibba, Genyoroge 263
gibba, Sciaena 263
gibbosum, Diagramma 411
gibbosus, Diagramma 410
gibbus, Lutianus 263
gibbus, Lutjanus 238, *263,* 283
gibbus, Mesoprion 263
Girella sarissophorus 231
Glabrilutjanus 235, 241
glauca, Sciaena 531
glaucus, Johnius 531
glaucus, Sciaena 531
Gnathocentrum 169
Gnathocentrum centrognathum 172
Gnathodentex 325, *347, 381*
Gnathodentex aurolineatus *348*
Goldiei, Mesoprion 263
goldmani, Argyrosomus 507
goldmani, Johnius 507
goldmani, Otolithus 507
goldmani, Pseudosciaena 506, *507*
goldmanni, Corvina 507
Goldmanni, Diagramma 418
goldmanni, Johnius 507
goldmanni, Plectorhynchus 410, *418*
goldmanni, Sciaena 507
Gonochaetodon 16, *47*
Gonochaetodon triangulum *48*
Gonochaetodon triangulum var. karraf 49
Gonochaetodon triangulum var. larvatus 49
Gothofredi, Lethrinus 453
gracilis, Dentex 380
gracilis, Nemipterus 356, *379*
Grammistes furcatus 399
Grammistes ghanam 337
?Grammistes lineatus 415

Grammistes pictus 426
grandoculis, Chrysophrys 350
grandoculis, Monotaxis *350*
grandoculis, Sciaena 350
grandoculis, Sparus 350
grandoculis, Sphaerodon 350
gridgutia, Coius 402
griseus, Dentex 391
griseus, Gymnocranius 391
griseus, Plectorhynchus 410, *429*
griseus, Synagris 391
grooti, Catopra 480
grooti, Pristolepis 479, *480*
grootii, Catopra 480
grootii, Pristolepis 480
grunniens, Pomadasis 406
grunniens, Pomadasys 406
guliminda, Dentex 369
guliminda, Spondyliosoma 369
güntheri, Chaetodon *79*
Güntheri, Lethrinus 442
güntheri, Tetragonoptrus *79*
güntheri, Tetragonoptrus 55
guoraca, Pomadasys 406
guoraca, Pristipoma 406
guoraka, Pomadasys 406
guttatissimus, Chaetodon 81, 111
guttulatus, Platax 189
Gymnocaesio 235, *315*
Gymnocaesio gymnopterus *316*
Gymnocranius 325, *390*
Gymnocranius frenatus 391
Gymnocranius griseus 391
Gymnocranius lethrinoides 391
Gymnocranius microdon 391
gymnopterus, Caesio 316
gymnopterus, Gymnocaesio *316*
gymnopterus, Smaris 316
haematochir, Diagramma 418
haematochir, Plectorhynchus 418
haematopterus, Lethrinus 431, *440*, 444
haffara, Chrysophrys 468
Harak, Lethrinus 450
hardwickii, Sciaenoides 496
Harpochirus 179
Harpochirus longimanus 180
Harpochirus punctatus 180
hasta, Chrysophrys 471
hasta, Lutjanus 402
hasta, Pomadasis 403
hasta, Pomadasys 398, *402*, 408
hasta, Pristipoma 402
hasta, Sparus 470
hawaiiensis var. of Chaetodon setifer 105
hellmuthi, Pentapus 382, 387, *388*
Hemitaurichthys 13, 15, *24*
Hemitaurichthys polylepis 25
Hemitaurichthys strigatus 23
Hemitaurichthys thompsoni 26
Hemitaurichthys zoster *25*
Heniochus 13, 15, *35*
Heniochus acuminatus 36, *37*
Heniochus chrysostoma 40
Heniochus chrysostomus 40
Heniochus diphreutes 38
Heniochus drepanoides 40
?Heniochus intermedius 38
Heniochus macrolepidotus 37, 41
Heniochus melanistion 40
Heniochus monoceros 36, *41*
Heniochus permutatus 36, 39, *40*
Heniochus pleurotaenia 43
Heniochus singularius 37, *45*
Heniochus varius 37, *42*, 45, 47
Heterodon 381
heterodon, Pagrus 350
heterodon, Sphaerodon 350
Heterodon zonatus 382
Heterognathodon 381
Heterognathodon bifasciatus 382
Heterognathodon caninus 389
Heterognathodon macrurus 387
Heterognathodon microdon 389
Heterognathodon nemurus 386
Heterognathodon xanthopleura 382
Heteropyge 145
Heteropyge navarchus 149
Heteropyge sexstriatus 147
Heteropyge xanthometopon 148
hexazona, Lobotes 462
hexodon, Dentex 360
hexodon, Nemipterus 354, *360*

hoedti, Malacanthus *550*
hoedtii, Malacanthus 550
Holacanthus 120, 121, *154*
Holacanthus alternans 131, 141
Holacanthus alternans var. meleagris 142
Holacanthus annularis 135
Holacanthus astur var. a 137
Holacanthus bicolor 162
Holacanthus bicolor var. oahuensis 162
Holacanthus bishopi 133
Holacanthus bispinosus 165
Holocanthus bispinous 157
Holacanthus caerulescens 141
Holacanthus caeruleus 137, 141
Holacanthus caudibicolor 153
Holacanthus caudovittatus 153
Holacanthus chapmani 152, 153
Holacanthus chrysocephalus 127
Holacanthus chrysurus 139
Holacanthus darwiniensis 125
Holacanthus diacanthus 156, 157, 165
Holacanthus dimidiatus 126
Holacanthus duboulayi 125
Holacanthus flavo-niger 69
Holacanthus geometricus 132
Holacanthus iburu 141
Holacanthus ignatius 141
Holacanthus imperator 132
Holacanthus lamarck 150, 151
Holacanthus lamarcki 151
Holacanthus lamarcki subsp. japonicus 152
Holacanthus lamarckii 151
Holacanthus lepidolepis 131, 141
Holacanthus leucopleura 163
Holacanthus loriculus 165
Holacanthus marianas 133
Holacanthus melanosoma 126
Holacanthus melanospilus 153
Holacanthus mesoleucos 123
Holacanthus mesoleucus 123
Holacanthus microlepis 141
Holacanthus multifasciatus 161
Holacanthus navarchus 149
Holacanthus nicobariensis 132
Holacanthus nox 164
Holacanthus poecilus 141
Holacanthus potteri 166
Holacanthus pseudannularis 135
Holacanthus reginae 142
Holacanthus rhomboides 137
Holacanthus ronin 127
Holacanthus semicinctus 153
Holacanthus semi-circularis 142
Holacanthus semicirculatus 137, 141
Holacanthus semicirculatus var. alternans 142
Holacanthus septentrionalis 122, 127, 135
Holacanthus sexstriatus 146
Holacanthus striatus 137
Holacanthus tenigab 162
Holacanthus tibicen 159
Holacanthus trimaculatus *155*
Holacanthus vroliki 164, 167
Holacanthus vrolikii 167
Holacanthus xanthometopon 145, 148
Holacanthus zebra 165
Holocentrus bengalensis 256
Holocentrus boutton 263
Holocentrus ciliatus 332
Holocentrus ghanam 337
Holocentrus radjabou 426
Holocentrus soldado 520
Holocentrus surinam 459
Holocentrus surinamensis 459
Holocentrus quinquelinearis 256
Holocentrus quinquelineatus 256
hober, Centropomus 270
hoteen, Mesoprion 241
Humefordia 317
Hypoplites 235
hypostoma, Johnius 527, *532*
hypostoma, Sciaena 532
hypostomus, Johnius 532
hypselognathus, Dentex 357
hypselognathus, Nemipterus 357, 359
hypselognathus, Synagris 357
hypselopterus, Lethrinus 431, 432, *443*
Hystricodon 212
iburu, Holacanthus 141
ignatius, Holacanthus 141

Ilarches 176
Ilarches orbis 177
immaculata, Diacope 279
immaculatus, Mesoprion 246
imperator, Chaetodon 132
imperator, Holacanthus 132
imperator, Pomacanthus 131, *132*, 140
incerta, Sciaena 563
incurvus, Lobotes 459
indica, Monotaxis 350
indica, Sciaena 544
indica, Umbrina 544
indicus, Pimelepterus 224
inermis, Scolopsides 330
inermis, Scolopsis 326, *330*
insulindicus, Lethrinus 447
intermedius, Heniochus 38
interruptus subsp. of Chaetodon unimaculatus 98
isacanthus, Dentex 361
isacanthus, Synagris 361
itoi, Pempheris 562
jaculator, Labrus 199
jaculator, Toxotes 197, 198, *199*, 203, 206
jaculatrix, Labrus 199
jaculatrix, Sciaena 197, 199
jaculatrix, Toxotes 200
Jagori, Lethrinus 438
janthinuropterus, Lutjanus 239, *281*, 284
janthinuropterus, Mesoprion 281
janthinurus, Mesoprion 263
japonicus, Nemipterus 355, *369*
japonicus, Sparus 369
japonicus, Synagris 369
japonicus var. of Genicanthus lamarck 152.
japonicus, subsp. of Holacanthus lamarcki 152
johni, Anthias 244
johni, Lutianus 245
johni, Lutjanus 236, *244*
Johni, Mesoprion 244
johnii, Benettia 244
johnii, Lutianus 272
Johnii, Lutjanus 244
johnii, Mesoprion 244
Johnius 485, 486, *526*, 541
Johnius anei 508, 517
Johnius aneus 508
Johnius axillaris 512
Johnius belangeri 533
Johnius belengeri 527, *533*
Johnius belengerii 533
Johnius birtwistlei 510
Johnius borneensis 523
Johnius cantor 541
Johnius Cantori 538, 541
Johnius carutta 527, *529*
Johnius catalea 515
Johnius cataleus 515
Johnius celebicus 520
Johnius chaptis 515
Johnius coibor 485, 517
Johnius diacanthus 515
Johnius dussumieri 527, *530*
Johnius glaucus 531
Johnius goldmani 507
Johnius goldmanni 507
Johnius hypostoma 527, *532*
Johnius hypostomus 532
Johnius jubatus 526, *527*
Johnius maculatus 527, *538*
Johnius maculatus var. 538
Johnius marleyi 513
Johnius microlepis 522
Johnius miles 520
Johnius novae-hollandiae 527, *537*
Johnius osseus 527, *541*
Johnius papuensis 512
Johnius parvus 513
Johnius plagiostoma 525
Johnius polycladiskos 519
Johnius ruber 490
Johnius sampitensis 520
Johnius semiluctuosa 535
Johnius semiluctuosus 527, *535*
Johnius sina 513
Johnius soldado 520
Johnius trachycephalus 526, *528*
Johnius Valenciennii 515
Johnius vogleri 513
Johnius Wolffii 520

jordani var. of Chaetodon vagabundus 108
jubata, Corvina 527
jubatus, Johnius 526, *527*
kaakan, Pristipoma 402
kakaan, Pristipoma 402
kallopterus, Lethrinus 431, *432*
karraf var. of Gonochaetodon triangulum 49
karwa, Lethrinus 453
kasmira, Diacope 257
kasmira, Evoplites 257
kasmira, Genyoroge 257
kasmira, Lutjanus 237, *256*
kasmira, Mesoprion 257
kasmira, Sciaena 256
kate, Scolopsides 341
kaupi var. of Chaetodon ornatissimus 71
kleini, Anisochaetodon *99*
kleini, Lepidochaetodon 95, 99
kleini, Lepidochaeton 100
kleini, Tetragonoptrus 100
kleinii, Chaetodon 99
klunzingeri, Chaetodon 66
Klunzingeri var. of Chaetodon trifasciatus 66
Kneri var. of Chaetodon collare 93
Kuhli, Umbrina 544
Kuhlii, Corvina 532, 533
Kuhlii, Sciaena 544
Kuhlii, Umbrina 544
Kuhliidae 559
Kyphosidae *221*, 556, 557
Kyphosus *222*
?Kyphosus bleekeri 228
Kyphosus cinerascens 223, *224*
Kyphosus lembus 223, *226*
Kyphosus oblongior 228
Kyphosus vaigiensis 224, *226*, 227
labiatus, Chaetodon 28
labiosum, Diagramma 427
labiosus, Spilotichthys 428
Labrus 546
Labrus argentatus 246
Labrus carutta 529
Labrus Commersoni 402
Labrus furcatus 318
Labrus jaculatrix 199
Labrus jaculator 199
Labrus latovittatus 551
Labrus spec. 544
?Labrus trivittatus 382
Lactariidae 555
lamarck, Genicanthus *151*
lamarck, Holacanthus 150, 151
lamarcki, Holacanthus 151
lamarckii, Genicanthus 151
lamarckii, Holacanthus 151
lateoides, Otolithes *488*
lateoides, Otolithus 488
latidens, Lethrinus 350
latidens, Sphaerodon 350
latifrons, Lethrinus 435
latifrons, Sparopsis 311
Latilidae 547
Latilus upeneoides 379
latovittata, Oceanops 551
latovittatus, Labrus 551
latovittatus, Malacanthus 550, *551*
latovittatus, Oceanops 551
latovittatus, Taenianotus 551
Layardi, Chaetodon 66
larvatus var. of Gonochaetodon triangulum 49
leachii, Chaetodon 51
Leiognathidae 557
?Leiopsis 380
Leiopsis Rafflesi 380
lembus, Kyphosus 223, *226*
lembus, Pimelepterus 226
lemniscata, Genyoroge 272
lemniscatus, Lutjanus 239, *283*
lemniscatus, Serranus 283
Lepidochaetodon *95*, *97*
Lepidochaetodon kleini 95, *99*
Lepidochaetodon trivirgatus 95, 101
Lepidochaetodon unimaculatus 95, *97*
lepidolepis, Acanthochaetodon 142
lepidolepis, Holacanthus 131, 141
lepisurus, Lutianus 276
lepisurus, Sparus 276

Lepodus 195
Leptobrama 210, *220*
Leptobrama mülleri *220*
Leschenaldi, Platax 185
Lessoni, Diagramma 416
Lessoni, Plectorhynchus 416
lessonii, Diagramma 423
Lethrinella 430
Lethrinella miniata 445
Lethrinella miniatus 445
Lethrinichthys 430
Lethrininae 233, *429*
lethrinoides, Dentex 391
lethrinoides, Gymnocranius 391
Lethrinus *430*, 453
Lethrinus acutus 436
Lethrinus amboinensis 432, 435, 438, 450
Lethrinus aurolineatus 447
Lethrinus Bleekeri 450
Lethrinus bonhamensis 450
Lethrinus bungus 444
Lethrinus carinatus 453
Lethrinus centurio 453
Lethrinus cinereus *456*
Lethrinus cocosensis 451
Lethrinus cutambi 452
Lethrinus elongatus 435
Lethrinus ehrenbergi 455
Lethrinus erythrurus 448, 450
Lethrinus esculentus 453
?Lethrinus fasciatus 452
Lethrinus flavescens 455
Lethrinus frenatus 441, 456
Lethrinus genivittatus 436, 438
Lethrinus Gothofredi 453
Lethrinus Güntheri 442
Lethrinus haematopterus 431, *440*, 444
Lethrinus Harak 450
Lethrinus hypselopterus 431, 432, *443*
Lethrinus insulindicus 447
?Lethrinus Jagori 438
Lethrinus kallopterus 431, *432*
?Lethrinus karwa 453
Lethrinus latidens 350
Lethrinus latifrons 435
Lethrinus leutjanus 432, *451*
Lethrinus longirostris 445
Lethrinus mahsena 432, 443, 444
Lethrinus mahsenoides? 447
Lethrinus microdon 431, *436*
Lethrinus miniatus 432, 436, *445*
Lethrinus moensi 436
Lethrinus nebulosus 432, 452, *453*, 456
Lethrinus nebulosus var. Chumchum 453
Lethrinus nebulosus var. ochrolineata 453
Lethrinus nematacanthus 431, *433*
Lethrinus olivaceus 438, 445
Lethrinus opercularis 450, 453
Lethrinus opercularius 454
Lethrinus ornatus 432, 447
Lethrinus papuensis 450
Lethrinus ramak 432, 436, 438, *455*
Lethrinus reticulatus 431, 436, *438*, 447
Lethrinus rhodopterus 432, *450*
Lethrinus richardsoni 440
Lethrinus rostratus 436, 445
Lethrinus scoparius 453
Lethrinus semicinctus 435
?Lethrinus sordidus 451
Lethrinus variegatus 431, *435*
Lethrinus waigiensis 445
Lethrinus xanthotaenia 447
leuciscus, Otolithus 508
leucopleura, Holacanthus 163
leucotaenia, Scolopsides 329
leucotaenia, Scolopsis 326, *329*
leucotaenioides, Scolopsides 329
leucurum, Pristipoma 410
leucurum, Pseudopristipoma 411
leutjanus, Bodianus 451
leutjanus, Lethrinus 432, *451*
lineata, Diacope 263, 281
lineata, Perca 415
lineatum, Diagramma 416, 426
lineatus, Grammistes 415
lineatus, Lutianus 282
lineatus, Lutjanus 281
lineatus, Mesoprion 281

lineatus, Plectorhinchus 422
lineatus, Plectorhinus 416
lineatus, Plectorhynchus 410, *415*
lineatus, Scolopsides 339
lineatus, Scolopsis 335
lineolata, Diacope 253
lineolatus, Anisochaetodon *114*
lineolatus, Cantharus 474
lineolatus, Chaetodon 114
lineolatus, Lutianus 254
lineolatus, Lutjanus 237, *253*
lineolatus, Mesoprion 253, 255
lineolatus, Oxychaetodon 96, *114*
lineolatus, Tetragonopterus 115
lineolatus, Tetragonoptrus 115
Linophora, *95*, 103
Linophora auriga 96, *103*
Linophora chrysurus 96, *111*
(Linophora) mertensi 111
Linophora rafflesi 96, *109*
Linophora vagabundus 96, *106*
(Linophora) xanthurus 111
lioglossus, Lutjanus 284
lioglossus, Mesoprion 284
Liopempheris sasaki 561
Loa excelsa 41
lobata, Corvina 533
Lobotes *457*
Lobotes auctorum 459
Lobotes citrinus 459
Lobotes erate 459
Lobotes farkhari 459
Lobotes farkharii 459
Lobotes hexazona 462
Lobotes incurvus 459
Lobotes microdon 391
Lobotes somnolentus 459
Lobotes surinamensis *459*
Lobotidae *457*, 558
lol, Chelmon 17
longifilis, Argyrops 467
longifilis, Pagrus 466
longimana, Drepane 180
longimana var. of Drepane punctata 180
longimanus, Chaetodon 180
longimanus, Harpochirus 180
longirostris, Chaetodon 17
longirostris, Chelmo 17
longirostris, Chelmon 17
longirostris, Forcipiger *17*
longirostris, Lethrinus 445
longirostris, Prognathodus 17
longulus, Scolopsis 329
lorentzi, Toxotes *198*
loriculus, Holacanthus 165
Loxolutjanus 235
lucida, Collichthys 495
luna, Cryptosmilia 180
lunaris, Caesio 296, 298, *299*
lunaris, Coesio 299
lunatus, Chaetodon 115
lunula, Chaetodon *83*, 109
lunula, Chaetodontops 55, *83*
lunula, Pomacentrus 83
lunula, Sarothrodus 84
lunula, Tetragonoptrus 84
lunulata, Perca 278
lunulatus, Lutianus 252
lunulatus, Lutjanus 239, *278*
lunulatus, Mesoprion 278
luteus, Nemipterus 371
luteus, Synagris 371
Lutianus annularis 266
Lutianus argentimaculatus 247
Lutianus bohar 276
Lutianus dodecantheoides 266, 270
Lutianus erythropterus 266
Lutianus fulviflamma 271, 284
Lutianus fuscescens 271, 273
Lutianus gembra 247
Lutianus gibbus 263
Lutianus johni 245
Lutianus johnii 272
Lutianus lepisurus 276
Lutianus lineatus 282
Lutianus lineolatus 254
Lutianus lunulatus 252
Lutianus madras 252
Lutianus nematophorus 240
Lutianus nishikawa 273
Lutianus nouleny 253
Lutianus quinquelineatus 273
Lutianus rivulatus 288

Lutianus russelli *272*
Lutianus salmonoides 247
Lutianus sebae 261
Lutianus semicinctus 275
Lutianus vitta 250
Lutjanidae *232*, 556, 557
Lutjaninae *233*
Lutjanus 234, *235*, 292
Lutjanus amboinensis 260
Lutjanus annularis 255
Lutjanus argentimaculatus 236, *246*
Lutjanus aurantius 425
Lutjanus aureovittatus 341
Lutjanus bengalensis 257
Lutjanus biguttatus 237, *255*
Lutjanus Blochii 251
Lutjanus bohar 239, *276*
Lutjanus butonensis 263
Lutjanus caeruleolineatus 257
?Lutjanus castelnaui 263
Lutjanus chaetodonoides 413
Lutjanus chirtah 266
Lutjanus chrysotaenia 237, *248*, 260
Lutjanus diacanthus 515
Lutjanus decussatus 240, *285*
Lutjanus dentex 314
Lutjanus dodecacanthoides 238, *269*
Lutjanus dodecacanthus 268
Lutjanus ehrenbergi 236, *242*
Lutjanus ellepticus 339
Lutjanus erythropterus 253, 265
Lutjanus flavipes 282
Lutjanus fulviflamma 239, *270*, 272
Lutjanus fulviflamma var. Ruselli *272*
Lutjanus furvicaudatus 281
Lutjanus fuscescens 236, *241*
?Lutjanus gembra 246
Lutjanus gibbus 238, *263*, 283
Lutjanus hasta 402
Lutjanus janthinuropterus 239, *281*, 284
Lutjanus johni 236, *244*
Lutjanus Johnii 244
Lutjanus kasmira 237, *256*
Lutjanus lemniscatus 239, 283
Lutjanus lineatus 281
Lutjanus lineolatus 237, *253*
Lutjanus lioglossus 284
Lutjanus lunulatus 239, *278*
Lutjanus lutjanus 237, *251*
lutjanus, Lutjanus 237, *251*
Lutjanus luzonius 260
Lutjanus macolor 289
Lutjanus maculatus 400
Lutjanus madras 252
Lutjanus malabaricus 238, *268*, 279
Lutjanus marginatoides 280
Lutjanus marginatus 279
Lutjanus maxweberi 236, *243*
Lutjanus melanotaenia 283
lutjanus, Mesoprion 252
Lutjanus microchir 311
Lutjanus microstoma 402
Lutjanus monostigma 239, 272, *284*
Lutjanus nematophorus 236, *240*
Lutjanus niger 240, *289*
Lutjanus notatus 257, *272*
Lutjanus oligolepis 242
Lutjanus olivaceus 252
Lutjanus Palmeri 243
Lutjanus pictus 426
Lutjanus pomacanthus 257
Lutjanus quinquelinearis 257
Lutjanus quinquelineatus 257
Lutjanus Quoyi 292
Lutjanus rangus 239, *274*
Lutjanus rivulatus 240, *287*
Lutjanus roseus 246
Lutjanus rufolineatus 238, *259*
Lutjanus russelli 239, 240, *272*
Lutjanus sanguineus 238, 255, *265*, 270
Lutjanus sebae 238, *261*
Lutjanus semicinctus 239, *275*
Lutjanus spilurus 257
Lutjanus tahitiensis 263
Lutjanus vaigiensis 239, *279*
Lutjanus vitta 237, *250*
Lutjanus Vosmaeri 341
Lutjanus waigiensis 280
luzonius, Lutjanus 260
lycogenis, Dentex 348
lycogenis, Scolopsides 332

macculIochi, Pseudomycterus 537
machas, Mesoprion 252
Macolor 235
macolor, Diacope 289
macolor, Genyoroge 289
macolor, Lutjanus 289
Macolor macolor 290
macolor, Macolor 290
Macolor macularis 290
macolor, Mesoprion 289
Macolor niger 290
Macolor typus 289
macrolepidotus, Chaetodon 37
macrolepidotus, Diphreutes 37
macrolepidotus, Heniochus 37, 41
macrolepidotus, Pempheris 214
macrolepidotus, Taurichthys 37
macronotus, Scatophagus 6
macrophthalmus, Corvina 508
macrophthalmus, Otolithus 508
macrophthalmus, Pseudosciaena 508
macrophthalmus, Sciaena 508
macrophthalmus, Scolopsis 328
macroptera, Sciaena 542, *546*
macroptera, Umbrina 546
macropterus, Umbrina 546
macrurus, Heterognathodon 387
macrurus, Pentapodus 387
macrurus, Pentapus 382, *387*
macularis, Macolor 290
maculata, Corvina 538
maculata, Sciaena 539
maculatum, Pomadasys 401
maculatus, Anthias 400
maculatus, Caesio 306
maculatus, Johnius 527, *538*
maculatus var., Johnius 538
maculatus, Lutjanus 400
maculatus, Otolithes 488, *493*
maculatus, Otolithus 493
maculatus, Pomadasis 401, 405
maculatus, Pomadasys 398, *400*
maculiceps, Chaetodon 58
maculiceps, Megaprotodon 57
madagascariensis subsp. of Chaetodon chrysurus 112
madras, Lutianus 252
madras, Lutjanus 252
madras, Mesoprion 252
Maenidae 179
mahagoni, Mesoprion 279
mahsena, Lethrinus 432, 443, *444*
mahsena, Sciaena 444
mahsenoides, Lethrinus 447
malabarica, Pempheris 213
malabaricus, Lutjanus 238, *268*, 279
malabaricus, Mesoprion 268
malabaricus, Sparus 268
Malacanthidae 547, 556
Malacanthus 548
Malacanthus hoedti 550
Malacanthus hoedtii 550
Malacanthus latovittatus 550, *551*
Malacanthus parvipinnis 550
Malacanthus taeniatus 551
Malacanthus urichthys 551
malaccensis var. of Toxotes jaculator 199
manadense, Pristipoma 403
manadensis, Pomadasys 403
mangula, Pempheris 213, 216, 218
marciae, Pimelepterus 227
margaritifer, Scolopsides 328
margaritifer, Scolopsis 326, *328*
margaritiferum, Scolopsis 328
marginalis, Chelmon 21
marginata, Diacope 279
marginata, Genyoroge 279
marginatoides, Lutjanus 280
marginatus, Chaetodon 87
marginatus, Dentex 372
marginatus, Lutjanus 279
marginatus, Mesoprion 279
marginatus, Nemipterus 355, *372*
marginatus, Pristolepis 478
marginipinnis, Mesoprion 279
marianas, Holacanthus 133
marleyi, Johnius 513
marleyi, Sciaena 513
marmoratus, Nandus 477
mauritianus, Smaris 306
maxweberi, Lutjanus 236, *243*

melammystax, Chaetodon 99
melanistion, Heniochus 40
melanopus, Chaetodon 30
melanopus, Coradion 28, *30*
melanopus, Ephippus 177
melanopus, Tetragonopterus 30
melanosoma, Chaetodontoplus 123, *126*
melanosoma, Holacanthus 126
melanosoma, Platax 185, *194*
melanospilus, Genicanthus 151, *153*
melanospilos, Genyoroge 259
melanospilus, Holacanthus 153
melanospilos, Mesoprion 259
melanotaenia, Lutjanus 283
melanotus, Chaetodon *87*
melanotus Chaetodontops 56, *87*
melanotus, Tetragonoptrus 87
melanura, Diacope 263
melanura, Genyoroge 263
melapterus, Chaetodon 69
melastomus, Chaetodon 99
melastomus, Tetragonopterus 99
meleagris var. of Holacanthus alternans 142
Megaprotodon 16, *50*, 59
Megaprotodon bifascialis 51
Megaprotodon maculiceps 57
Megaprotodon plebeius 57
Megaprotodon striangulus 51
Megaprotodon strigangulus *51*
Menidae 179, 559
mertensi, Citharoedus 111
mertensi, Linophora 111
mertensi, Tetragonoptrus 111
mertensii, Anisochaetodon 112
mertensii, Chaetodon 112
mesoleucos, Holacanthus 123
mesoleucus, Holacanthus 123
mesoleucus, Chaetodon 123
mesoleucus, Chaetodontoplus *123*
mesomelas, Chaetodon 123
Mesoprion 235
Mesoprion amboinensis 259
Mesoprion annularis 265
Mesoprion bleekeri 255
Mesoprion bengalensis 257
Mesoprion bottonensis 263
Mesoprion calveti 269
Mesoprion caroui 253
Mesoprion chirtah 265
Mesoprion chrysotaenia 248
Mesoprion coeruleopunctatus 288
Mesoprion decussatus 285
mesoprion, Dentex 373
Mesoprion dentex 314
Mesoprion dodecacanthoides 269
Mesoprion dodecacanthus 268
Mesoprion Ehrenbergi 242
Mesoprion enneacanthus 250
Mesoprion erythropterus 253, 292
Mesoprion erythrozona 292
Mesoprion fulviflamma 270
Mesoprion fuscescens 241
Mesoprion Gaimardi 279
Mesoprion garretti 246
Mesoprion gembra 246
Mesoprion gibbus 263
?Mesoprion Goldiei 263
Mesoprion hoteen 241
Mesoprion immaculatus 246
Mesoprion janthinuropterus 281
Mesoprion janthinurus 263
Mesoprion Johni 244
Mesoprion johnii 244
Mesoprion Kasmira 257
Mesoprion lineatus 281
Mesoprion lineolatus 253, 255
Mesoprion lioglossus 284
Mesoprion lutjanus 252
Mesoprion lunulatus 278
Mesoprion machas 252
Mesoprion macolor 289
Mesoprion madras 252
Mesoprion mahagoni 279
Mesoprion malabaricus 268
Mesoprion marginatus 279
Mesoprion marginipinnis 279
Mesoprion melanospilos 259
Mesoprion microchir 311
Mesoprion Mitchelli 293
Mesoprion monostigma 284
Mesoprion multidens 314
Mesoprion myriaster 287

Mesoprion nematophorus 240
Mesoprion niger 290
Mesoprion octolineatus 257
Mesoprion olivaceus 252
Mesoprion Ophuysenii 250
Mesoprion parvidens 288
Mesoprion phaiotaeniatus 250
Mesoprion pomacanthus 257
Mesoprion quadriguttata 276
Mesoprion rangus 246, 274
(Mesoprion) rubella 265
Mesoprion rubellus 265
? Mesoprion rubens 279
Mesoprion rufolineatus 259
Mesoprion Russelli 272
Mesoprion sambra 246
Mesoprion sanguineus 265
Mesoprion Sebae 261
Mesoprion semicinctus 275
? Mesoprion sexfasciatus 275
Mesoprion striatus 281
mesoprion, Synagris 373
Mesoprion taeniops 246
Mesoprion therapon 286
Mesoprion unimaculatus 244
Mesoprion vitta 250
Mesoprion xanthopterygius 253
? Mesoprion yapilli 244
metallicus, Diacope 265
metopias, Dentex 365
metopias, Nemipterus 354, *365*
metopias, Synagris 365
meyeri, Chaetodon *69*
meyeri, Citharoedus 54, 69
meyeri, Tetragonopterus 70
meyeri, Tetragonoptrus 70
Microcanthus 13, 15, *22*
Microcanthus strigatus *22*
microchir, Chaetopterus 311
microchir, Mesoprion 311
microchir, Lutjanus 311
microdon, Collichthys 503
microdon, Dentex 391
microdon, Gymnocranius 391
microdon, Heterognathodon 389
microdon, Lethrinus 431, *436*
microdon, Lobotes 391
microdon, Otolithus 503
microdon, Otolithoides 500, *503*
microdon, Pentapus 382, *389*
microdon, Sciaena 503
microdon, Sciaenoides 503
Microlabrichthys 235
microlepis, Aprion 311, *312*
microlepis, Chaetodon 139
microlepis, Chaetopterus 312
microlepis, Datnioides 462, *463*
microlepis, Holacanthus 141
microlepis, Johnius 522
microlepis, Pristipomoides 311, *312*
microlepis, Pseudosciaena 507, *522*
microlepis, Toxotes 198, 199, *202*
microstoma, Lutjanus 402
miles, Corvina 520
miles, Johnius 520
miles, Pseudosciaena 520
miles, Sciaena 520
miliaris, Chaetodon 77, 79, *80*
miliaris, Tetragonoptrus 55, 77, *80*
miniata, Lethrinella 445
miniatus, Lethrinella 445
miniatus, Lethrinus 432, 436, *445*
miniatus, Sparus 445
Mirolabrichthys 321, 557
Mirolabrichthys tuka *322*
Mirolabrichthys waitei 322, *323*
Mitchelli, Mesoprion 293
moensi, Lethrinus 436
moluca, Pempheris 212, *213*, 218
molucca, Pempheris 213
Monodactylidae 206, 557
Monodactylus 207
Monodactylus argenteus *207*
Monodactylus falciformis 207, 209
Monodactylus rhombeus 207
monogramma, Scolopsides 344, 345
monogramma, Scolopsis 327, 344, *345*
monoceros, Heniochus 36, *41*
monoceros, Taurichthys 41
monostigma, Diacope 284
monostigma, Lutjanus 239, 272, *284*
monostigma, Mesoprion 284
Monotaxis 325, *349*

Monotaxis grandoculis *350*
Monotaxis indica 350
Montrouzieri, Zanclus 172
Mülleri, Chelmon 21
mülleri, Corvina 521
mülleri, Leptobrama *220*
mülleri, Sciaena 520
mülleri, Umbrina 521
Mullidae 555
mulloides, Dentex 367
mulloides, Nemipterus 367
mulloides, Synagris 367
mulsanti, Chaetodon 59
multicinctus, Chaetodon 75
multicinctus subsp. of Chaetodon punctato-fasciatus 75
multidens, Anthias 314
multidens, Mesoprion 314
multifasciatus, Centropyge 160, *161*
multifasciatus, Holacanthus 161
multifasciatus, Scatophagus 6, *10*, 13
multiradiatus, Caesio 296
multiradiatus, Pterocaesio 296
multivittata, Diagramma 418
multivittatus, Plectorhynchus 418
myriaster, Mesoprion 287
nageb, Pomadasys 403
nageb, Pristipoma 402
Nandidae *475*, 556, 558
Nandinae 475, 476
nandioides, Catopra 479
nandoides, Catopra 479
Nandus *476*
Nandus borneensis 477
Nandus marmoratus 477
Nandus nebulosus *477*
navarchus, Euxiphipops 146, *149*
navarchus, Heteropyge 149
navarchus, Holacanthus 149
nebulosa, Sciaena 453
nebulosus, Bedula 477
nebulosus, Lethrinus 432, 452, *453*, 456
nebulosus, Nandus 477
neilli, Corvina 517
nematacanthus, Lethrinus 431, *433*
nematophorus, Dentex 366
nematophorus, Lutianus 240
nematophorus, Lutjanus 236, *240*
nematophorus, Mesoprion 240
nematophorus, Nemipterus 354, *366*
nematophorus, Synagris 366
nematopus, Dentex *372*
nematopus, Synagris *372*
Nemipterinae 233, *324*
Nemipterus 325, *352*, 375
Nemipterus balinensis 356, *375*
Nemipterus balinensoides 356, *376*
Nemipterus celebicus 354, *362*
Nemipterus gracilis 356, *379*
Nemipterus hexodon 354, *360*
Nemipterus hypselognathus 357, 359
Nemipterus japonicus 355, *369*
Nemipterus luteus 371
Nemipterus marginatus 355, *372*
Nemipterus mesoprion 355, *373*
Nemipterus metopias 354, *365*
Nemipterus mulloides 367
Nemipterus nematophorus 354, *366*
Nemipterus nemurus 354, *364*
Nemipterus ovenii 354, *359*
Nemipterus oveniides 355, *371*
Nemipterus peronii 354, *357*
Nemipterus robustus 357
Nemipterus sumbawensis 356, *377*
Nemipterus sundanensis 354, *358*, 360
Nemipterus taeniopterus 361
Nemipterus tambuloides 355, *374*
Nemipterus tolu 355, *367*
Nemipterus upeneoides 356, *379*
Nemipterus zysron 356, *378*
nemurus, Dentex 364
nemurus, Heterognathodon 386
nemurus, Nemipterus 354, *364*
nemurus, Pentapodus 386
nemurus, Pentapus 382, *386*, 389
nemurus, Synagris 364
Neochaetodon vittatus 23
Neomaenis 235
Neopempheris 220
Neopempheris pectoralis 221
Neopempheris ramsayi 220
nesogallica, Pempheris 213, 218
nesogallicus, Chaetodon 106

nesogallicus, Tetragonopterus 107
nicobariensis, Chaetodon 132
niger, Lutjanus 240, *289*
niger, Macolor 290
niger, Mesoprion 290
niger, Proamblys 289
niger, Sciaena 289
nigra, Diacope 289
nigra, Genyoroge 289
nigricans, Chaetodon 185
nigripes, Chaetodon 77
nigripes subsp. of Chaetodon citrinellus 77
nigromaculata, Corvina 516
nigrum, Diagramma 411
nigrum, Pristipoma 410
nigrus, Plectorhinchus 411
nishikawa, Lutianus 273
nitidus, Polotus 402
notata, Diacope 256
notata, Genyoroge 272
notatus, Anemura 361
notatus, Dentex 361
notatus, Lutjanus 257, 272
notatus, Synagris 361
nototaenia, Scolopsis 346
nouleny, Lutianus 253
nouleny, Serranus 253
novae-Hollandiae, Corvina 537
novae-hollandiae, Johnius 527, *537*
novae-Hollandiae, Sciaena 537
novemmaculeatus, Platax 182
nox, Centropyge 160, *164*
nox, Holacanthus 164
nubilis Pentapaodus 453
nyctereutes, Pempheris 561
oahuensis var. of Holacanthus bicolor 162
oblongior, Kyphosus 228
oblongior, Pimelepterus 226, 227
obtusus, Dentex 367
occellatus, Chaetodon 84
Oceanops 548
Oceanops latovittata 551
Oceanops latovittatus 551
ocellatum, Diagramma 427
ocellatus, Chaetodon 33, 84
ocellatus, Parachaetodon *33*
ocellatus, Platax 32, 33
ocellicauda, Chaetodon 89
ochrolineata var. of Lethrinus nebulosus 453
octofasciatus, Chaetodon 72
octofasciatus, Citharoedus 73
octofasciatus, Tetragonopterus 73
octofasciatus, Tetragonoptrus 55, 73
octolineata, Diacope 256
octolineatus, Chaetodon 73
octolineatus, Mesoprion 257
Odontoglyphis 352
Odontonectes 296
Odontonectes erythrogaster 298
Odontonectes pinjalo 293
oligacanthus, Chaetodon 32, 33
oligacanthus, Parachaetodon 33
oligacanthus, Sarothrodus 33
oligacanthus, Tetragonoptrus 33
oligolepis, Lutjanus 242
oligolepis, Toxotes 198, *205*
olivaceum, Pristipoma 407
olivaceus, Diacope 252
olivaceus, Lethrinus 438, 445
olivaceus, Lutjanus 252
olivaceus, Mesoprion 252
olivaceus, Pomadasys 398, *407*
olivaceus, Pristipoma 407
opercularis, Lethrinus 450, 453
opercularius, Lethrinus 454
Ophuysenii, Mesoprion 250
Opisthistius tahmel 224
orbicularis, Chaetodon 189
orbicularis, Platax 185, *189*
orbis, Chaetodipterus 177
orbis, Chaetodon 177
orbis, Ephippus *177*
orbis, Ilarches 177
ornatissimus, Chaetodon *71*
ornatissimus, Citharoedus 54, 71
ornatissimus, Tetragonoptrus 71
ornatus, Chaetodon 71
ornatus, Lethrinus 432, *447*
ornatus, Scatophagus 6
orientale, Diagramma 425
orientalis, Anthias 425

orientalis, Otolithus 492
orientalis, Plectorhynchus 410, *425*
orientalis, Serranus 425
ossea, Bola 541
ossea, Sciaena 541
osseus, Johnius 527, *541*
otaitensis, Pempheris 213, 216, *217*
Otolithes 484, *487*
Otolithes argenteus 488, *492*
Otolithes lateoides *488*
Otolithes maculatus 488, 493
Otolithes ruber 488, *490*
Otolithes versicolor 488
Otolithinae 481, 484, 486
Otolithoides 485, *499*
Otolithoides biauritus *500*
Otolithoides brunneus 500, *502*
Otolithoides microdon 500, *503*
Otolithus 487
Otolithus aneus 508
Otolithus argenteus 488, 492
Otolithus biauritus 500
Otolithus bispinosus 493
Otolithus borneensis 523
Otolithus brunneus 502
Otolithus dolorosus 488
Otolithus goldmani 507
Otolithus lateoides 488
Otolithus leuciscus 508
Otolithus macrophthalmus 508
Otolithus maculatus 493
Otolithus microdon 503
Otolithus orientalis 492
Otolithus ruber 490
Otolithus submaculatus 490
?Otolithus versicolor 488
Otolithus vogleri 513
oxycephalus, Chaetodon 115
oxycephalus, Tetragonopterus 115
oxycephalus var. of Chaetodon lineolatus 115
Oxychaetodon *96,* 114
Oxychaetodon lineolatus 96, *114*
Oxychaetodon falcula 97, *116*
ovalis, Chaetodon 66
Ovenii, Dentex 359
ovenii, Nemipterus 354, *359*
ovenii, Synagris 359
oveniides, Nemipterus 355, *371*
oualensis, Pempheris 212
Pachymetopon squamosum 224
Pagrus berda 471
Pagrus bifasciatus 473
Pagrus filamentosus 466
Pagrus heterodon 350
Pagrus longifilis 466
Pagrus spinifer 466
paikeeli, Pristipoma 399
Palmeri, Lutjanus 243
palytaenia, Plectorhynchus 415
Pama 485, *495*
pama, Bola 495, 496
pama, Collichthys 496
pama, Pama *496*
Pama pama *496*
Pama perarmata 482, 496, *498*, 555
pama, Sciaena 496
pama, Sciaenoides 496
Papuense, Diagramma 413
papuensis, Corvina 512
papuensis, Johnius 512
papuensis, Lethrinus 450
papuensis, Plectorhynchus 413
Parachaetodon 15, *32,* 33
Parachaetodon ocellatus *33*
Parachaetodon oligacanthus 33
Paradentex 390
paradiseus, Pentapus 384
parallelus, Chaetodon 91
parallelus var. of Chaetodon collare 91
Paranandus 478
pardale, Diagramma 413
pardalis, Diagramma 413
Parkia 235
(Parkia) furvicaudata 281
parva, Sciaena 513
parvidens, Mesoprion 288
parvipinnis, Malacanthus 550
parvus, Johnius 513
pascalus, Entonanthias 322
paucifasciatus subsp. of Chaetodon chrysurus 112
pavoninus, Serranus 244

pectinatus, Scolopsides 328
Pempheridae *210,* 216, 557, 561
Pempheris *210,* 216, 561
Pempheris adustus 217
Pempheris itoi 562
Pempheris macrolepidotus 214
Pempheris malabarica 213
Pempheris mangula 213, 216, 218
Pempheris moluca 212, *213,* 218
Pempheris molucca 213
Pempheris nesogallica 213, 218
Pempheris nyctereutes 561
Pempheris otaitensis 213, 216, *217*
Pempheris oualensis 212, *216*
Pempheris rhomboideus 215
Pempheris sasaki 561
Pempheris sasakii 561
Pempheris schwenki 213, 219
Pempheris touea 210
Pempheris vanicolensis 213, 215, *218*
pentacanthus, Chaetodon 189
pentacanthus, Platax 189
?Pentapaodus nubilis 453
Pentapodus macrurus 387
Pentapodus nemurus 386
Pentapodus setosus 385
Pentapus 325, 347, *380*
Pentapus aurolineatus 348
Pentapus caninus 382
Pentapus formosulus 387
Pentapus hellmuthi 382, 387, *388*
Pentapus macrurus 382, *387*
Pentapus microdon 382, *389*
Pentapus nemurus 382, *386,* 389
Pentapus paradiseus 384
Pentapus setosus 382, *384*
Pentapus trivittatus 383
Pentapus vittatus 382
Pentapus xanthopleura 383
pepek, Chaetodon 66
perarmata, Pama 482, 496, *498,* 555
perarmata, Sciaenoides 498
Perca argentata 246
Perca aurata 341
?Perca diagramma 415
Perca fulviflamma 270
?Perca lineata 415
Perca lunulata 278
Perca picta 426
Perciformes 1, 555
Percoidea 1
Percomorphi 1
permutatus, Heniochus 36, 39, *40*
Peronii, Dentex 357
peronii, Nemipterus 354, *357*
personatus, Scolopsides 333
personatus, Scolopsis 326, *333*
phaeops, Scolopsides 346
phaeops, Scolopsis 327, 345, 346
phaiotaeniatus, Mesoprion 250
phoeops, Scolopsides 346
pica, Diagramma 425
picoides, Diagramma 425
picta, Perca 426
pictum, Diagramma 427
pictus, Chaetodon 106
pictus, Grammistes 426
pictus, Lutjanus 426
pictus, Plectorhinchus 428
pictus, Plectorhynchus 410, *426*
pictus, Spilotichthys 428
pictus var. of Anisochaetodon vagabundus 107
pictus var. of Chaetodon vagabundus 107
Pimelepterus 222
Pimelepterus altipinnis 224
Pimelepterus bosci 222
Pimelepterus cinerascens 224
Pimelepterus dussumieri 224
Pimelepterus fuscus 228
Pimelepterus indicus 224
Pimelepterus lembus 226
Pimelepterus marciae 227
?Pimelepterus oblongior 226, 227
Pimelepterus Raynaldi 224
Pimelepterus tahmel 224
Pimelepterus ternatensis 226
Pimelepterus vaigiensis 227
Pimelepterus waigiensis 227
Pimelopterus tahmel 224
Pinjalo 234, *292*
pinjalo, Caesio 293
pinjalo, Pinjalo *293*

Pinjalo pinjalo *293*
pinjalo, Odontonectes 293
Pinjalo typus 293
pinnatus, Chaetodon 192
pinnatus, Platax 185, *192*, 194
pisang, Caesio 296, *302*
plagiostoma, Corvina 525
plagiostoma, Johnius 525
plagiostoma, Pseudosciaena 507, *525*
Platacinae 2, 182
Platax *183*
Platax anagon 186
Platax albipunctatus 185
Platax arthriticus 185, 191
Platax Blochi 189
Platax Blochii 189
Platax Boersii 185
Platax batavianus 185, *191*
Platax Ehrenbergi 189
Platax expansus 193
Platax Gaimardi 185
Platax gampret 193
Platax guttulatus 189
Platax Leschenaldi 185
Platax melanosoma 185, *194*
Platax novemmaculeatus 182
Platax ocellatus 32, 33
Platax orbicularis 185, *189*
Platax pentacanthus 189
Platax pinnatus 185, *192*, 194
Platax punctulatus 185
Platax Raynaldi 185, 189
Platax teira 184, *185*
Platax vespertilio 189
Platax vespertilio japonicus 185
Platax xanthopus 185
plebeius, Chaetodon *56*
plebeius, Megaprotodon 57
plebeius, Tetrachaetodon 53, *56*
plebejus, Chaetodon 56
Plectorhinchus albovittatus 422
Plectorhinchus chaetodonoides 413
Plectorhinchus chaetodontoides 413
Plectorhinchus crassispinus 411
Plectorhinchus diagramma 416, 423
Plectorhinchus faetela 419, 420
Plectorhinchus lineatus 422
Plectorhinchus nigrus 411
Plectorhinchus pictus 428
Plectorhinchus polytaenia 415
Plectorhinchus radjabau 427
Plectorhinus lineatus 416
plectorhynchos, Diagramma 413
Plectorhynchus 397, *409*, 469
Plectorhynchus albovittatus 410, *422*
Plectorhynchus affinis 411
Plectorhynchus bateatus 427
Plectorhynchus blochii 427
plectorhynchus, Chaetodon 413
Plectorhynchus chaetodonoides 410, *413*
Plectorhynchus celebicus 410, 420
Plectorhynchus chrysotaenia 410, *419*, 422
Plectorhynchus crassispina *410*
Plectorhynchus crassispinus 411
Plectorhynchus cuvieri 410, 418, *423*
plectorhynchus, Diagramma 413
Plectorhynchus diagramma 416, 423 428
Plectorhynchus goldmanni 410, *418*
Plectorhynchus griseus 410, 429
Plectorhynchus haematochir 418
Plectorhynchus Lessoni 416
Plectorhynchus lineatus 410, *415*
?Plectorhynchus multivittatus 418
Plectorhynchus orientalis 410, *425*
Plectorhynchus palytaenia 415
Plectorhynchus papuensis 413
Plectorhynchus pictus 410, *426*
Plectorhynchus poecilopterus 427
Plectorhynchus polytaenia 410, *414*
Plectorhynchus polytaenioides 414
Plectorhynchus punctatus 427
Plectorhynchus radja 416
Plectorhynchus radjaban 427
Plectorhynchus Sebae 423
Plesiopidae 558
pleurotaenia, Heniochus 43
poecilus, Holacanthus 141
poecilopterum, Diagramma 427
poecilopterus, Plectorhynchus 427
polota, Coius 460, 462
polota, Datnioides 462

Polotus nitidus 402
polycladiscus, Corvina 519
polycladiscus, Pseudosciaena 507, 519
polycladiskos, Johnius 519
polykladiscos, Corvina 519
polylepis, Chaetodon 25
polylepis, Hemitaurichthys 25
polylepis, Tetragonopterus 25
polytaenia, Diagramma 414
polytaenia, Plectorhinchus 415
polytaenia, Plectorhynchus 410, *414*
polytaenioïdes, Diagramma 414
polytaenioides, Plectorhynchus 414
Pomacanthodes *131*
Pomacanthodes annularis 132, *135*
Pomacanthodes chrysurus 132, *139*
Pomacanthodes imperator 131, *132*
Pomacanthodes semicirculatus 132, *141*
Pomacanthodes striatus 132, *137*
Pomacanthinae 2, *119*
Pomacanthodes 129
Pomacanthus 114, 121, *129,* 130, 131, 140
Pomacanthus annularis *135*
Pomacanthus canescens 172
Pomacanthus chrysurus 132, *139*
pomacanthus, Evoplites 257
pomacanthus, Lutjanus 257
Pomacanthus imperator 131, *132,* 140
pomacanthus, Mesoprion 257
Pomacanthus nicobariensis 131
Pomacanthus semicirculatus 131, *141*
Pomacanthus striatus 131, *137*
Pomacanthus zonipectus 131
Pomacentrus enneodactylus 341
Pomacentrus falcula 116
Pomacentrus filamentosus 103
Pomacentrus lunula 83
Pomadasis grunniens 406
Pomadasis hasta 403
Pomadasis maculatus 401, 405
Pomadasynae 233, *396*
Pomadasys *397*
Pomadasys argyreus 398, *406*
Pomadasys auritus 399, *408*
Pomadasys furcatus 398, *399,* 407
Pomadasys grunniens 406
Pomadasys guoraca 406
Pomadasys guoraka 406
Pomadasys hasta 398, *402,* 408
Pomadasys maculatum 401
Pomadasys maculatus 398, *400*
Pomadasys manadensis 403
Pomadasys nageb 403
Pomadasys olivaceus 398, *407*
Pomadasys therapon 400
Pomadasys violaceus 407
Pomatomidae 555
potteri, Holacanthus 166
praetextatus, Chaetodon 91
praetextatus var. of Chaetodon collare 91
Priacanthidae 559
princeps, Chaetodon 109
princeps, Sarothrodus 110
principalis, Chaetodon 59
principalis var. of Chaetodon ephippium 60
Pristipoma 397
Pristipoma aculatum 400
pristipoma, Aprion 314
Pristipoma argenteum 403
Pristipoma argenteus 403
Pristipoma argyreum 406
Pristipoma auritum 408
Pristipoma caripa 400
pristipoma, Chaetopterus 314
Pristipoma chrysobalion 402
pristipoma, Centropristis 314
Pristipoma commersoni 402
pristipoma, Dentex 314
Pristipoma furcatum 399
Pristipoma guoraca 406
Pristipoma hasta 402
Pristipoma kaakan 402
Pristipoma kakaan 402
?Pristipoma leucurum 410
Pristipoma maculatum 400
Pristipoma manadense 403
Pristipoma nageb 402
?Pristipoma nigrum 410
Pristipoma olivaceum 407
Pristipoma paikeeli 399

Pristipoma therapon 400
Pristipoma olivaceus 407
Pristipomoides 310
Pristipomoides argyrogrammicus 314
Pristipomoides aurolineatus 303
Pristipomoides microlepis 311, *312*
Pristipomoides typus 311, *313*
Pristipomoides sp. aff. typus 315
Pristipomus 397
Pristolepidinae 475, 478
Pristolepis fasciata 480
Pristolepis fasciatus *479*, 481
Pristolepis grooti 479, *480*
Pristolepis grootii 480
Pristolepis marginatus 478
Proamblys 235
Proamblys niger 289
Prognathodus longirostris 17
Propoma 308
Proteracanthus 222, *230*
Psettus, 207
Psettus argenteus 207
?Psettus Commersonii 207
Psettus rhombeus 207
pseudannularis, Holacanthus 135
Pseudomysterus maccullochi 537
Pseudoplesiopidae 559
Pseudopristipoma leucurum 411
Pseudosciaena 485, 486, 505, 511, 524, 540, 563
Pseudosciaena albida 517
Pseudosciaena amblyceps 505
Pseudosciaena anaeus 509
Pseudosciaena anea 508
Pseudosciaena aneus 506, *508*
Pseudosciaena axillaris 506, *511*
Pseudosciaena birtwistlei 506, *510*
Pseudosciaena borneensis 507, *523*
Pseudosciaena coibor 507, *517*
Pseudosciaena diacanthus 507, *515*
Pseudosciaena goldmani 506, *507*
Pseudosciaena macrophthalmus 508
Pseudosciaena microlepis 507, *522*
Pseudosciaena miles 520
Pseudosciaena plagiostoma 507, *525*
Pseudosciaena polycladiscus 507, *519*
Pseudosciaena sina 506, 513, 563
Pseudosciaena soldado 507, *520*
Pseudosciaena vogleri 513
Pterocaesio 295
Pterocaesio multiradiatus 296
Pterocaesio tile 296
pulcher, Chelmo 20
punctata, Drepane 180
punctato-fasciatus, Chaetodon 75
punctato-fasciatus, Citharoedus 75
punctato-fasciatus, Tetragonopterus 75
punctato-fasciatus, Tetragonoptrus 55, *75*
punctatum, Diagramma 426
punctatus, Chaetodon 76, 180
punctatus, Drepanichthys 181
punctatus, Harpochirus 180
punctatus, Plectorhynchus 427
punctulatum, Diagramma 427
punctulatus, Chaetodon 77
punctulatus, Platax 185
purpurascens, Scatophagus 6
Pygoplites 122, *156*
Pygoplites diacanthus 157
quadranus, Scatophagus 7
quadrifasciatus, Chaetodon 462
quadrifasciatus, Coius 462
quadrifasciatus, Datnioides 462
quadriguttata, Diacope 276
quadriguttata, Mesoprion 276
quinquelinearis, Holocentrus 256
quinquelinearis, Lutjanus 257
quinquelineatus, Holocentrus 256
quinquelineatus, Lutianus 273
quinquelineatus, Lutjanus 257
Quoyi, Lutjanus 292
Rachycentridae 555
radja, Diagramma 416
radja, Plectorhynchus 416
radjaban, Plectorhynchus 427
radjabau, Plectorhinchus 427
radjabau, Spilotichthys 427
radjabou, Holocentrus 426
rafflesi, Anisochaetodon 2, *109*
rafflesi, Chaetodon 109
rafflesi, Linophora 96, *109*
rafflesi, Tetragonoptrus 110

rafflesii, Chaetodon 110
Rafflesii, Leiopsis 380
ramak, Lethrinus 432, 436, 438, *455*
ramak, Sciaena 455
ramak, Sparus 455
ramsayi, Neopempheris 220
rangus, Lutjanus 239, *274*
rangus, Mesoprion 246, 274
Raynaldi, Pimelepterus 224
Raynaldi, Platax 185, 189
reginae, Holacanthus 142
reinwardti, Chaetodon 88
resimus, Chaetodon 147
reticularis, Chaetodon 93
reticulatus, Lethrinus 431, 436, *438*, 447
Rhabdophorus *53*, 59
Rhabdophorus bennetti 54, *62*
Rhabdophorus ephippium 53, *59*
Rhabdophorus semeion 53, *61*
Rhabdophorus speculum 54, *64*
Rhabdophorus trifasciatus 54, *66*
rhodopterus, Lethrinus 432, *450*
rhombeus, Centrogaster 207
rhombeus, Centropodus 207
rhombeus, Monodactylus 207
rhombeus, Psettus 207
rhombeus, Scomber 207
rhomboides, Holacanthus 137
rhomboideus, Pempheris 215
Rhomboplitoides 235
Rhyacanthias 308
Rhyacanthias carlsmithi 309
richardsoni, Lethrinus 440
rivulata, Diacope 287
rivulata, Genyoroge 288
rivulatus, Lutianus 288
rivulatus, Lutjanus 240, *287*
Roa excelsa 41
robustus, Nemipterus 357
ronin, Holacanthus 127
rosea, Diacope 246
roseus, Lutjanus 246
rostratus, Chaetodon 20, 197, 199
rostratus, Chelmo 20
rostratus, Chelmon *20*, 197
rostratus, Lethrinus 436, 445
Roughleyia australis 470
rubella, Diacope 265
rubella, Mesoprion 265
rubellus, Mesoprion 265
rubens, Mesoprion 279
ruber, Dentex 360, 380
ruber, Johnius 490
ruber, Otolithes 488, *490*
ruber, Otolithus 490
rufolineata, Diacope 259
rufolineatus, Lutjanus 238, *259*
rufolineatus, Mesoprion 259
russeli, Sciaena 542, *544*
Russelii, Umbrina 544
russelli, Lutianus 272
russelli, Lutjanus 239, 240, *272*
Russelli var. of Lutjanus fulviflamma 272
Russelli, Mesoprion 272
russelli, Umbrina 544
russellii, Sciaena 544
russellii, Umbrina 544
ruthiae, Zanclus 172
rutilans, Fares 320
Sacrestinus 317
sacrestinus, Caranxomorus 318
salmonoides, Lutianus 247
sambra, Alphestes 246
sambra, Mesoprion 246
sampitensis, Corvina 520
sampitensis, Johnius 520
sanguinea, Diacope 265
sanguineus, Lutjanus 238, 255, *265*, 270
sanguineus, Mesoprion 265
sarba, Chrysophrys 468
sarba, Sparus 466, *468*
sarissophorus, Crenidens 230
sarissophorus, Girella 231
Sarothrodus auriga 104
Sarothrodus baronessa 48
Sarothrodus Bennetti 63
Sarothrodus lunula 84
Sarothrodus oligacanthus 33
Sarothrodus princeps 110
Sarothrodus strigangulus 51
Sarothrodus vagabundus 107

Sarothrodus vittatus 66
sasaki, Liopempheris 561
sasaki, Pempheris 561
sasakii, Pempheris 561
Scarus Schlosseri 199
Scatophaginae 2, *3*
Scatophagus 2, 5, *6*
?Scatophagus aetate-varians 10
Scatophagus argus *6*, 13
Scatophagus argus var. tetracanthus 6, *9*
Scatophagus, Bougainvillii 6
Scatophagus fasciatus 9, 12
Scatophagus macronotus 6
Scatophagus multifasciatus 6, *10*
Scatophagus ornatus 6
Scatophagus purpurascens 6
Scatophagus quadranus 7
Scatophagus tetracanthus 9
Schlosseri, Scarus 199
Sciaena 485, 486, 540, *541*
Sciaena albida 517
Sciaena aneus 508
Sciaena argentata 246
Sciaena argentea 520
Sciaena argentimaculata 246
Sciaena aquila 486
Sciaena axillaris 511
Sciaena belangeri 533
Sciaena belengeri 533
Sciaena bohar 276
Sciaena borneensis 523
Sciaena cinerascens 224
Sciaena cirrhoca 541
Sciaena coibor 517
Sciaena diacanthus 515
Sciaena dussumieri 531, 541
Sciaena faetela 422
Sciaena fulviflamma 270
Sciaena ghanam 337
Sciaena gibba 263
Sciaena glauca 531
Sciaena glaucus 531
Sciaena goldmanni 507
Sciaena grandoculis 350
Sciaena hypostoma 532
Sciaena incerta 563
Sciaena indica 544
Sciaena jaculatrix 197, 199
Sciaena kasmira 256
Sciaena Kuhlii 544
Sciaena macrophthalmus 508
Sciaena macroptera 542, *546*
Sciaena macropterus *546*
Sciaena maculata 539
Sciaena mahsena 444
Sciaena marleyi 513
Sciaena microdon 503
Sciaena miles 520
Sciaena mülleri 520
Sciaena nebulosa 453
Sciaena niger 289
Sciaena novae-Hollandiae 537
Sciaena ossea 541
Sciaena pama 496
Sciaena parva 513
Sciaena ramak 455
Sciaena russeli 542, *544*
Sciaena semiluctuosa 535
Sciaena sina 513
Sciaena trachycephalus 528
Sciaena vogleri 513
Sciaenidae *481*, 484, 486, 489, 499, 502, 555
Sciaeninae 481, 485, 486
Sciaenoides 495, 499, 500
Sciaenoides biauritus 500
Sciaenoides brunneus 502
Sciaenoides hardwickii 496
Sciaenoides microdon 503
Sciaenoides pama 496
Sciaenoides perarmata 498
Scolopsides bilineatus 339
Scolopsides cancellatus 336
Scolopsides caninus 382
Scolopsides ghanam 337
Scolopsides inermis 330
?Scolopsides kate 341
Scolopsides leucotaenia 329
Scolopsides leucotaenioides 329
Scolopsides lineatus 339
Scolopsides lycogenis 332
Scolopsides margaritifer 328
Scolopsides monogramma 344, 345

Scolopsides pectinatus 328
Scolopsides personatus 333
Scolopsides phaeops 346
Scolopsides phoeops 346
Scolopsides temporalis 342
Scolopsides torquatus 341
Scolopsides Vosmeri 341
Scolopsis *325*
Scolopsis affinis 345
Scolopsis aurata 341
Scolopsis auratus 341
Scolopsis bilineata 339
Scolopsis bilineatus 327, *339*
Scolopsis bimaculatus 334, 344
Scolopsis Bleekeri 336, 339
Scolopsis cancellata 336
Scolopsis cancellatus 327, *335*
Scolopsis caninus 382
Scolopsis ciliata 332
Scolopsis ciliatus 326, *332*
Scolopsis dubiosus 327, 334, *344*
Scolopsis elongatus 383
Scolopsis ghanam 327, *337*
Scolopsis inermis 326, *330*
Scolopsis leucotaenia 326, *329*
Scolopsis lineatus 335
Scolopsis longulus 329
Scolopsis macrophthalmus 328
Scolopsis margaritifer 326, 328
Scolopsis margaritiferum 328
Scolopsis monogramma 327, 344, *345*
Scolopsis nototaenia 346
Scolopsis personatus 326, *333*
Scolopsis phaeops 327, 345, *346*
Scolopsis taeniatus 345
Scolopsis taeniopterus 326, *335*
Scolopsis temporalis 327, *342*
Scolopsis torquatus 341
Scolopsis trilineatus 326, *331*
Scolopsis vosmaeri 327, *341*
Scolopsis vosmeri 341
Scolopsis xenochrous 327, *338*
Scomber rhombeus 207
scoparius, Lethrinus 453
sebae, Chaetodon 110
Sebae, Diacope 261
Sebae, Diagramma 423
sebae, Genyoroge 261
sebae, Lutianus 261
sebae, Lutjanus 238, *261*
Sebae, Mesoprion 261
Sebae, Plectorhynchus 423
sebanus, Chaetodon 103
selene, Chaetodon *90*
selene, Chaetodontops 56, *90*
selene, Tetragonopterus 90
selene, Tetragonoptrus 90
semeion, Chaetodon *61*
semeion, Rhabdophorus 53, *61*
semeion, Tetragonoptrus 61
semicinctus, Holacanthus 153
semicinctus, Lethrinus 435
semicinctus, Lutianus 275
semicinctus, Lutjanus 239, *275*
semicinctus, Mesoprion 275
semi-circularis, Holacanthus 142
semicirculatus, Acanthochaetodon 142
semicirculatus, Holacanthus 137, 141
semicirculatus, Pomacanthodes 132, *141*
semicirculatus, Pomacanthus 131, 132, *141*
semiluctuosa, Corvina 535
semiluctuosa, Johnius 535
semiluctuosa, Sciaena 535
semiluctuosus, Johnius 527, 535
semipunctatus var. of Chaetodon citrinellus 77, 82
septentrionalis, Acanthochaetodon 128
septentrionalis, Chaetodontoplus 123, *127*
septentrionalis, Holacanthus 122, 127, 135
Serranidae 322, 556, 558, 559
?Serranus argyrogrammicus 313
Serranus biguttatus 255
Serranus decussatus 285
Serranus lemniscatus 283
Serranus nouleny 253
Serranus orientalis 425
Serranus pavoninus 244
Serranus vitta 250
Serranus zonatus 315

setifer, Chaetodon 103
setifer, Tetragonopterus 104
setifer subsp. of Chaetodon auriga 104
setosus, Chaetodon 193
setosus, Pentapodus 385
setosus, Pentapus 382, *384*
sexfasciatus, Mesoprion 275
sexstriatus, Euxiphipops *146*
sexstriatus, Heteropyge 147
sexstriatus, Holacanthus 146
siamensis, Catopra 479
siamensis, Diacope 261
Sibbaldi, Diagramma 425
Sillaginidae 555
sina, Corvina 513
sina, Johnius 513
sina, Pseudosciaena 506, *513*, 563
sina, Sciaena 513
singularius, Heniochus 37, *45*
Smaris gymnopterus 316
Smaris mauritianus 306
soldado, Corvina 520
soldado, Johnius 520
soldado, Holocentrus 520
soldado, Pseudosciaena 507, *520*
sordidus, Lethrinus 451
somnolentus, Lobotes 459
Sparidae *465*, 558
Sparopsis 310
Sparopsis elongatus 311
Sparopsis latifrons 311
Sparus *465*
Sparus aries 468
Sparus aurolineatus 348, 381
Sparus australis 466, *469*
Sparus berda 466, *470*
Sparus bifasciatus 466, *473*
Sparus calamara 471
Sparus choerorhynchus 442
?Sparus cuning 298
Sparus datnia 471
Sparus forsteri 395
Sparus grandoculis 350
Sparus hasta 470
Sparus japonicus 369
Sparus lepisurus 276
Sparus malabaricus 268
Sparus miniatus 445
Sparus ramak 455
Sparus sarba 466, *468*
Sparus spinifer 465, *466*
Sparus tranquibaricus 244
Sparus trivittatus 384
?Sparus vittatus 382, 384
speculum, Citharoedus 64
speculum, Chaetodon 58, *64*
speculum, Rhabdophorus 54, *64*
speculum, Tetragonopterus 64
Sphaerodon 349
Sphaerodon euanus 351
Sphaerodon grandoculis 350
Sphaerodon heterodon 350
Sphaerodon latidens 350
sphenospilus, Chaetodon 98
sphenospilus subsp. of Chaetodon unimaculatus 98
spilopleura, Chaetodon 64
spilopleura, Citharoedus 64
Spilotichthys labiosus 428
Spilotichthys pictus 428
(Spilotichthys) radjabau 427
spilurus, Lutjanus 257
spilurus, Symphorus 394, *395*
spinifer, Argyrops 467
spinifer, Pagrus 466
spinifer, Sparus 465, *466*
spinifera, Chrysophrys 467
Spondyliosoma 474
?Spondyliosoma guliminda 369
squamosum, Pachymetopon 224
squamosus, Amblytoxotes 195
squamosus, Toxotes 195
striata, Diacope 263
striatus, Acanthochaetodon 137
striatus, Caesio 303
striatus, Holacanthus 137
striatus, Mesoprion 281
striatus, Pomacanthodes 132, *137*
striatus, Pomacanthus 131, *137*
striangulus, Chaetodon 51
striangulus, Megaprotodon *51*
strigangulus, Chaetodon 51
strigangulus, Megaprotodon 51

strigangulus, Sarothrodus 51
strigangulus, Tetragonopterus 51
strigata, Therapaina 23
strigatus, Chaetodon *22*
strigatus, Hemitaurichthys 23
strigatus, Microcanthus *22*
submaculatus, Otolithus 490
sumbawensis, Dentex 377
sumbawensis, Euthyopteroma 377
sumbawensis, Nemipterus 356, *377*
sundanensis, Dentex 358
sundanensis, Nemipterus 354, *358*, 360
surinam, Holocentrus 459
surinamensis, Holocentrus 459
surinamensis, Lobotes *459*
Symphorus 325, *394*
Symphorus forsteri 395
Symphorus spilurus 394, *395*
Symphorus taeniolatus 395
Symphysanodon 234, *308*
Symphysanodon typus 309
Synagris 352
Synagris balinensoides 376
?Synagris bleekeri 372
?Synagris blekeri 372
Synagris celebicus 362
Synagris filamentosus 369
Synagris furcosus 357, 361
Synagris griseus 391
Synagris hypselognathus 357
Synagris isacanthus 361
Synagris japonicus 369
Synagris luteus 371
Synagris mesoprion 373
Synagris metopias 365
Synagris mulloides 367
Synagris nematophorus 366
Synagris nematopus 372
Synagris nemurus 364
Synagris ovenii 359
Synagris taeniopterus 361
Synagris tambuloides 374
Synagris tolu 362, 367
Synagris upeneoides 379
Synagris zysron 378
?Synagris sp. aff. Bleekeri 372
Taenianotus latovittatus 551
taeniatus, Malacanthus 551
taeniatus, Scolopsis 345
taeniolatus, Symphorus *395*
taeniops, Mesoprion 246
taeniopterus, Dentex 361
taeniopterus, Nemipterus 361
taeniopterus, Scolopsis 326, *335*
taeniopterus, Synagris 361
tahitiensis, Lutjanus 263
tahmel, Opisthistius 224
tahmel, Pimelepterus 224
tahmel, Pimelopterus 224
Tallii, Chaetodon 115
tambuloides, Dentex 374
tambuloides, Nemipterus 355, *374*
tambuloides, Synagris 374
tambulus, Dentex 358, 369
tau-nigrum, Chaetodon 66
taunigrum, Citharoedus 66
Taurichthys 35
Taurichthys chrysostomus 40
Taurichthys macrolepidotus 37
Taurichthys monoceros 41
Taurichthys varius 42
Taurichthys viridis 42
teira, Chaetodon 185
teira, Platax 184, *185*
temporalis, Scolopsides 342
temporalis, Scolopsis 327, *342*
tenigab, Holacanthus 162
teres, Caesio 301
ternatensis, Pimelepterus 226
tetracanthus, Cacodoxus 9
tetracanthus, Chaetodon 9, 12
tetracanthus, Desmoprenes 10
tetracanthus, Ephippus 9
tetracanthus, Scatophagus 9
tetracanthus var. of Scatophagus argus 6, *9*
Tetrachaetodon 53, *56*, 59
Tetrachaetodon plebeius 53, *56*
Tetragonopterus auriga 104
Tetragonopterus biocellatus 84
Tetragonopterus chrysozonus 28
Tetragonopterus citrinellus 76
Tetragonopterus falcula 117

Tetragonopterus fasciatus 84
Tetragonopterus lineolatus 115
Tetragonopterus melanopus 30
Tetragonopterus melastomus 99
Tetragonopterus meyeri 70
Tetragonopterus nesogallicus 107
Tetragonopterus octofasciatus 73
Tetragonopterus oxycephalus 115
Tetragonopterus polylepis 25
Tetragonopterus punctato-fasciatus *75*
Tetragonopterus selene 90
Tetragonopterus setifer 104
Tetragonopterus speculum 64
Tetragonopterus strigangulus 51
Tetragonopterus ulietensis 117
Tetragonopterus unimaculatus 98
Tetragonopterus vagabundus 107
Tetragonopterus xanthurus 111
Tetragonopterus Zanzibariensis 65
Tetragonoptrus *55, 72*
Tetragonoptrus auriga 104
Tetragonoptrus baronessa 48
Tetragonoptrus Bennetti 63
Tetragonoptrus biocellatus 84
Tetragonoptrus chrysurus 111
Tetragonoptrus citrinellus 55, *76*
Tetragonoptrus collaris 91
Tetragonoptrus ephippium 60
Tetragonoptrus falcula 117
Tetragonoptrus fasciatus 84
Tetragonoptrus güntheri 55, *79*
Tetragonoptrus kleini 100
Tetragonoptrus lineolatus 115
Tetragonoptrus lunula 84
Tetragonoptrus melanotus 87
Tetragonoptrus mertensi 111
Tetragonoptrus meyeri 70
Tetragonoptrus miliaris 55, 77, *80*
Tetragonoptrus octofasciatus 55, *72*
Tetragonoptrus oligacanthus 33
Tetragonoptrus ornatissimus 71
Tetragonoptrus punctato-fasciatus 55, *75*
Tetragonoptrus rafflesi 110
Tetragonoptrus selene 90
Tetragonoptrus semeion 61
Tetragonoptrus triangulum 48
Tetragonoptrus trifasciatus 66
Tetragonoptrus unimaculatus 98
Tetragonoptrus vagabundus 107
Tetragonoptrus vittatus 66
Tetragonoptrus xanthurus 111
Therapaina *22*
Therapaina strigata 23
therapon, Mesoprion 286
therapon, Pomadasys 400
therapon, Pristipoma 400
Theraponidae 559
Tholichthys 1, 4, 5, 36, 65, 106
thompsoni, Aphareus 319
thompsoni, Hemitaurichthys 26
tibicen, Centropyge 160, *163*
tibicen, Holacanthus 159
tile, Caesio 295, *296*
tile, Pterocaesio 296
timoriensis, Diacope 268
tolu, Dentex 367
tolu, Nemipterus 355, *367*
tolu, Synagris 362, 367
torquatus, Scolopsides 341
torquatus, Scolopsis 341
touea, Pempheris 210
townleyi, Chaetodon 33
Toxotes, *20, 195*
Toxotes blythi 199, 202, 203
Toxotes chaleareus 204
Toxotes chatareus 197, *198,* 203
Toxotes jaculator 197, 198, *199,* 203, 206
Toxotes jaculator var. malaccensis 199
Toxotes lorentzi *198*
Toxotes microlepis 198, 199, *202*
Toxotes oligolepis 198, *205*
Toxotes squamosus 195
Toxotidae *194,* 199, 556
trachycephalus, Corvina 528
trachycephalus, Johnius *526,* 528
trachycephalus, Sciaena 528
tranquibaricus, Sparus 244
Triacanthopsis 211
triangularis, Chaetodon 51
triangularis, Eteira 51

triangulum, Chaetodon 48
triangulum, Citharoedus 48
triangulum, Gonochaetodon *48*
triangulum, Tetragonoptrus 48
trifascialis, Chaetodon 51
trifasciatus, Chaetodon 51, *66*
trifasciatus, Rhabdophorus 54, *66*
trifasciatus, Tetragonoptrus 66
trilineatus, Scolopsis 326, *331*
trilineatus var. of Genicanthus lamarck 152
trimaculatus, Apolemichthys *155*
trimaculatus, Holacanthus *155*
trivirgatus, Anisochaetodon *101*
trivirgatus, Lepidochaetodon 95, *101*
trivittatus, Labrus 382
trivittatus, Pentapus 383
trivittatus, Sparus 384
tuka, Mirolabrichthys 322
tutuilae, Centropyge 166
typus (affinis), Pristipomoides 315
typus, Aprion 311, *313*
typus, Macolor 289
typus, Pinjalo 293
typus, Pristipomoides 311, *313*
typus, Symphysanodon *309*
Ulaula 310
ulietensis, Chaetodon 117
ulietensis, Tetragonopterus 117
Umbrina 541
Umbrina amblycephalus 542
Umbrina dussumieri 542
Umbrina fuscolineata 544
Umbrina indica 544
Umbrina Kuhli 544
Umbrina Kuhlii 544
Umbrina macroptera 546
Umbrina macropterus 546
Umbrina mülleri 521
Umbrina russeli 545
Umbrina Russelii 544
Umbrina russelli 544
Umbrina russellii 544
unicolor, Diagramma 411
unicolor, Genyoroge 263
unifasciatus, Chaetodon 91
unimaculatus, Anisochaetodon *97*
unimaculatus, Chaetodon 97
unimaculatus, Citharoedus 98
unimaculatus, Lepidochaetodon *95*, 97, 98
unimaculatus, Mesoprion 244
unimaculatus, Tetragonopterus 98
unimaculatus, Tetragonoptrus 98
upeneoides, Dentex 379
upeneoides, Latilus 379
upeneoides, Nemipterus *379*
upeneoides, Synagris 379
upenoides, Nemipterus 356
urichthys, Malacanthus 551
vagabundus, Anisochaetodon *100*
vagabundus, Chaetodon 106
vagabundus, Linophora 96, *106*
vagabundus, Sarothrodus 107
vagabundus, Tetragonopterus 107
vagabundus, Tetragonoptrus 107
vaigiensis, Dentex 292
vaigiensis, Diacope 279
vaigiensis, Kyphosus 226, *227*
vaigiensis, Lutjanus 239, *279*
vaigiensis, Pimelepterus 227
Valenciennii, Johnius 515
vanicolensis, Pempheris 213, 215, *218*
variegatus, Lethrinus 431, *435*
varius, Diphreutes 42
varius, Heniochus 37, *42*, 45, 47
varius, Taurichthys 42
versicolor, Otolithes 488
versicolor, Otolithus 488
verticosus, Chaetodon 135
vespertilio, Chaetodon 189
vespertilio japonicus, Platax 185
vespertilio, Platax 189
vinctus, Chaetodon 62
violaceus, Pomadasys 407
virescens, Aprion *311*
virescens, Chaetodon 99
viridis, Chaetodon 91
viridis, Diphreutes 42
viridis, Taurichthys 42
vitta, Diacope 250
vitta, Lutianus 250
vitta, Lutjanus 237, *250*
vitta, Mesoprion 250

vitta, Serranus 250
vittatus, Chaetodon 66
vittatus, Citharoedus 66
vittatus, Neochaetodon 23
vittatus, Pentapus 382
vittatus, Sarothrodus 66
vittatus, Sparus 382
vittatus, Tetragonoptrus 66
vogleri, Johnius 513
vogleri, Otolithus 513
vogleri, Pseudosciaena 513
vogleri, Sciaena 513
Vosmaeri, Lutjanus 341
vosmaeri, Scolopsis 327, *341*
vosmeri, Anthias 341
Vosmeri, Scolopsides 341
vosmeri, Scolopsis 341
vroliki, Centropyge 160, *167*
vroliki, Holacanthus 164, 167
vrolikii, Holacanthus 167
waigiensis, Kyphosus 224
waigiensis, Lethrinus 445
waigiensis, Lutjanus 280
waigiensis, Pimelepterus 227
waitei, Mirolabrichthys 322, *323*
wiebeli, Chaetodon 84
Wolffii, Corvina 520
Wolffii, Johnius 520
xanthometopon, Euxiphipops 146, 148
xanthometopon, Heteropyge 148
xanthometopon, Holacanthus 145, 148
xanthonotus, Caesio 296, 301
xanthopleura, Heterognathodon 382
xanthopleura, Pentapus 383
xanthopterus, Dentex 391
xanthopterygius, Mesoprion 253
xanthopus, Diacope 279
xanthopus, Platax 185
xanthotaenia, Lethrinus 447
xanthozona, Diacope 244
xanthurus, Chaetodon 111
xanthurus, Linophora 111
xanthurus, Tetragonopterus 111
xanthurus, Tetragonoptrus 111
xanthurus subsp. of Chaetodon chrysurus 112
xenochrous, Scolopsis 327, *338*
Xiphipops 159
yapilli, Mesoprion 244
Zabidius 182
Zanclinae 2, *168*
Zanclus *169*
Zanclus canescens 170, *172*
Zanclus centrognathus 172
Zanclus cornutus *170*
Zanclus Montrouzieri 172
Zanclus ruthiae 172
zanzibariensis, Chaetodon 65
Zanzibariensis, Tetragonopterus 65
zebra, Holacanthus 165
zonatus, Anthias 315
zonatus, Heterodon 382
zonatus, Serranus 315
zonipectus, Pomacanthus 131
zoster, Chaetodon 25
zoster, Hemitaurichthys *25*
zysron, Dentex 378
zysron, Nemipterus 356, *378*
zysron, Synagris 378